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#### Contributions.

#### Bridge Guard Rails.

Department of Civil Engineering,
Mass. Institute of Technology,
Boston, Mass., Nov. 12, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of two weeks ago, in connection with our illustration and description of the bridge floor your industration and description of the bridge noor adopted on the Michigan Central Railroad, you make the following statement: "It is the experience of the road that in many, if not in most, cases where freight-car wheels have been derailed before reaching a bridge they have worked over past the centre line of the track, and the guard rails converging to a point at the centre line have aggravated the mischief." The italics are mine. As this is an argument frequently brought against this arrangement of guard rails, I take the liberty of saying that it would be a matter of much interest to me, as well as to many others, if you or any of your readers would state instances of actual occurrence in which derailed trucks have actually taken the wrong side of the point at bridges provided with guard rails as described; that is, converging to a point in the centre of the track.

Of course, if a truck is off the track by more than half the gauge it will take the wrong side of the point and be still further deviated; but although I have inquired extensively among railroad men I have not yet learned of any instance in which this has actually taken place; as a simple matter of information I should like very much to know of any such instance which you may have record of, and of the results which ensued.

GEO. F. SWAIN. [We remember no such case. We gave the experi ence of the Michigan Central on the authority of the

Chief Engineer, Mr. Hawks, and we believe in his own words.—Editor Railroad Gazette.]

### Sawed or Hewed Pine.

Lancashire & Yorkshire Railway, MANCHESTER, Oct. 8, 1889. TO THE EDITOR OF THE RAILROAD GAZETTE.

SIR: I should be pleased if you could give me any infor mation as to the respective qualities of sawed and hewed pitch pine. Our idea is that the latter is considerably stronger and more durable than the former, and is also

much brighter and the appearance generally superior.

Is there anything in the question of the sawed pitch pine being freely tapped before being cut down and so robbed of its nature?

CHICAGO, Ill., Oct. 29, 1889.

To the Editor of the Railroad Gazette.

I will gladly give you what little information I have gathered during my experience with Southern pine. While traveling in the South I found that a great mount of Southern pine was being hewed. I also

While traveling in the South I found that a great amount of Southern pine was being hewed. I also noticed that the men that were doing the hewing selected their logs; that is to say, they always selected the straight-grained logs, with as few knots as possible, to make the work of hewing easier. I also noticed that they were very particular in hewing the logs as smooth as possible. These are two very good reasons why hewed timber should be stronger, brighter and more durable; the timber being straight grained, its strength would be greater, and being hewed smooth. strength would be greater, and being straight grained, its strength would be greater, and being hewed smooth, the water would run off more readily and the grain would be closed, not allowing the dampness to penetrate so freely. It also makes the timber look brighter.

There is no more sawed timber that is tapped than there is hewed timber. I always consider tapping trees a great damage to the timber. A great many trees in the South are tanged corrected.

South are tapped, especially more so in Mississippi than in any other state.

In sawing timber the logs are not selected from straight trees. Any tree that will make a good square timber is

taken and put on the carriage, and sawed straight and square edged. If the tree is crooked and they saw it straight, the timber will be cross-grained at the point where the tree is crooked. Sawed timber in the rough is fuzzy and will hold the water, allowing it to pene-trate, and will rot sooner than straight-hewed timber. I do not think that there would be a great deal of difference between hewed and sawed timber if the same

kind of trees were selected and the sawed timb

#### The Use of the Fusee Signal.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Having read all the accounts published by you of the Palatine Bridge collision on the New York Central & Hudson River Railroad, I am surprised that no mention has been made of the fusee signal. Rule 31, of the standard code, says: "A fusee is an extra danger signal to be lighted and placed on the track at night, in case of accident or emergency." You will note that the fuse of must be used "in case of accident or emergency." Rule 31 of the standard code does not, in my opinion

go far enough and state specifically how the fu should be used. To say the fusee must be placed on the track at night in case of accident or emergency, and not say under what circumstances it must be used and where to place it, leaves it discretionary with the brake-man what to do. Why should this be so?

The explanation is, I suppose, this: In your editorial of Oct. 4 you say, "the Time Convention Committee doubtless recognized the difficulty of formulating a rule by which brakemen could be clearly instructed as to what action should be taken when a train slackens speed but does not come to a full stop, and they were perhaps warranted in promulgating this rule in this way. Each manager was left free to make amendments in any proper way, and the committee can claim with reason that they are not responsible for any dangerous omissions." Allow me to ask if the assembled wisdom of the Time Convention Committee recognized the difficulty of formulating a rule, will not a manager recognize the same difficulty? Brakemen or flagmen should "be clearly instructed as to what action should be taken when a train slackens speed but does not come to a full stop." I therefore offer the following as a substitute or, if you please, an amendment to code rule 31:

SEC. 1. A fusee is an extra danger signal, to be lighted and thrown on the track, at intervals of five minutes for five-minute fusees, and at intervals of ten minutes for ten-minute fusees, at night or in foggy weather, whenever the train is not making schedule speed, and is being followed by another train. A train finding a fusee burn ing on the track must come to a full stop, and not pro

eed until it is burnt out.
SEC. 2. The engineer of a forward train, finding that his train is not making schedule speed, when a train is known to be following in the same schedule, or who has to stop, must at once give the signal for brakes, when the flagman or brakeman must signal at once fusees as provided for in Sec. 1 of this rule, until the train has slowed down sufficiently for the brakeman or flagman to get off, when he will proceed to protect his train, as provided for in rule 99. Sec. 3. The engineer of a following train, finding that

the forward train is slacking speed at any place, will, if his engine [speed] is under control, blow on and off brakes, er and conductor of the forward train may be as sured of their safety, but if he is not satisfied that he can stop in time, he must continue to signal for brakes as a danger signal to the forward train.

The fusee signal is, in my opinion, the most reliable for night and foggy weather, and its great advantage over the lamp and torpedo is that it can be thrown from the rear of a train at any speed and will signal the following train without already in the signal than the signal train without already in the signal is a signal train without already in the signal is a signal in the signal is a signal in the signal in the signal is a signal in the signal in the signal is a signal in the signal is a signal in the signal in the signal is a signal in the signal in the signal in the signal is a signal in the signal in the signal in the signal in the signal is a signal in the s train without slacking the speed or stopping the forward train for the flagman to get off to protect his train, as provided for in rule 99. There is one thing that must provided for in rule 99. There is one thing that must not be lost sight of, the danger is in slacking speed or stopping the forward train for the flagman to get off. While this is done the following train, running at full speed, closes up on the forward train before the flagman can go back far enough to stop the following train. With the fusee signal slacking aread or stopping is not necessary until it is known that speed or stopping is not necessary until it is known that the following train is under control. This I provide for in the third section of the substitute or amendment l propose to code rule 31. TRANSPORTATION.

### Car Service Reform

TO THE EDITOR OF THE RAILROAD GAZETTE:

It may be truthfully said that, with one notable exception, wonderful have been the improvements in all the departments of railroad service during the past twenty years. The exception is the Car Service Department; and the present seems a most opportune time to mention the fact and its consequence. Whilst other departments are constantly economizing operation through more efficient service as the result of experience, just the opposit is the case in this one. This fact is proven by statistics collected and published during the past two years, which show conclusively that freight cars cost more, and do less, than ever before. Published equipment lists show 1.050 116 freight cars in revenue service, which represents show 1,050,116 freight cars in revenue service, which repre sent capital of about \$500,000,000. That this vast inter est is suffering through the operation of a wrong principle

of service, which is amendable by administrative effort, is also a fact, and one that should at once attract the attention of all those who have authority to inaugur reforms which require action by executive officers. I wrong principle of operation is found in the fact that more or less, probably one-half, of this vast equipment (\$250,000,000) is constantly out of the possession of its owners, who have no guarantee of earnings, or check on service performed; that there is no redress in case the cars are used to move business in which their owners have no interest, or even when diverted to the uses of a competing line; and that the matter of non-movement or delay to the cars is one of but little concern to the road holding them, there being no cost so long as the cars stand still, which fact has much to do with the growth of the custom which is fast converting the freight car from a vehicle of transportation into a storehouse.

In consequence of the wrong business principle which underlies the present car service system, not only the economy of the operations of the railroad service is seriously affected, but just now the shipping interest of the whole country is suffering. Look at the i Statistics collected by the Car Accountants' Associ show the average performance of freight cars to be from 17 to 25 miles per car per day, which estimate is substantially corroborated by the figures of tonnage handled. According to Poor's Manual, during the year 1888 there were 70,423 millions of tons of freight moved one mile by all the railroads in the United States. Placing the average car load at 15 tons, which is the minimum billing weight now generally used, it required 4,605 million car miles to move the total tonnage of last year. At 20 miles per car per day, 1,005,116 cars would in one year run 7,337% million miles, which, after moving the tonnage, would leave 2,642½ million miles, or about 36 per cent., to spare for the empty movement. At 20 miles per car per day, with trains moving 10 miles per hour, the equipment was sufficient to move the tonnage by being kept in motion only two hours out of every 24. Under a proper system, cars should average in motion at least four hours ou 24, when just one-half the number of cars would be quired to move the same tonnage. So much on the

question of economy.

Now on the question of injury to the shipping interest. The conditions of trade and the money market compel the producer to turn his product into money quickly, and to do this, with a few exceptions, he must have cars shortage of cars throughout the country for the move-ment of shipments offered will substantiate my propo-sition. The newspapers make frequent mention of "car famines" in different sections, and of the threats of Shippers to sue for damage or appeal to state or national Commissioners; but I have sought evidence more reliable than newspaper reports. On Oct. 27, as Chairman of the Per Diem Committee of the Car Accountants' Association, I addressed a letter to the officers in charge of car service of 30 different roads in all parts of the country, asking information as to the situation on their lines with reference to car supply and demand. Al have replied with one or two exceptions, and the situation is graphically shown in their replies below:

Pennsylvania Lines west of Pittsburgh (northwest system).
—Short about 1,600 cars. This is a sample of the situation as it has been for the last month, and the situation is very discouraging. It seems but little use to build cars, as in spite of our most earnest efforts they get away on foreign roads and are hard to get home.

EDMUND YARDLEY.

Fall Brook Coal Co.—We are running short about 200 cars allv.

Allegheny Valley.—Our average daily shortage is about 150
ARS. W. K. McElroy.

ars.

Buffalo, Roch. & Pittsburgh.—Short about 175 cars per day.
T. F. Brennan.

New York, Pennsylvania & Ohio.—Average shortage for past three days, 850 cars.

D. W. MOOAR.

Michigan Central.—In the neighborhood of 2,500 cars behind n our orders to-day. Never were in such hard straits for cars J. H. MASTEN

Grand Trunk.—Short at the present time, exclusive of the number required by connections, about 2,500 cars daily.

C. R. Wiesenborn.

Chicago & Grand Trunk,—Short from 800 to 1,200 cars per ay. F. C. VOGEL.

Missouri Pacific.—Shortage during past 30 days has been from 300 to 500 cars per day, caused simply by the fact that our cars are not unloaded promptly at terminals or returned promptly from connecting lines.

C. W. HEQUEMBOURG.

Wabash.—Short from 200 to 500 cars per day. Strong de-nurrage enforced by all roads is the lever that will stop the torchouse business and increase equipment capacity from ne-third to one-half over present performance. C. P. CHESEBRO.

Central of New Jersey.—If we had them, could use 2,500 cars to-day to ship steel rails, and 500 more for ore. The demand for cars is enormous, but if our cars were returned home within a reasonable time could cope with the business offered. We have great faith in demurrage and per diem. The one to compel shippers to unload and the other to induce railroads to return cars home promptly. With this the vexed question of car service can be solved.

F. E. Highe.

Philadelphia & Reading.—The demand with us for cars is very largely in excess of the supply.

A. J. Speese.

Delaware & Hudson Canal Co.—We are in great distress or cars; 250 short on local orders daily. G. A. KELLAR.

Western & Atlantic.—All roads in the southeastern territory tre very badly pressed for rolling stock. The cry is cars from

all directions. The roads in the south are ordering much ad-ditional equipment. I think, however, there are enough cars in the United States already if they were properly handled. E. C. SPALDING.

Mobile & Ohio.—Short from 25 to 100 cars every day. Steps should be taken to prevent the diversion of cars to improper routes and uses, which evil is steadily increasing.

A. B. Wilmer.

East Tenn., Va. & Georgia.—Difficult to say just how man cars we are short daily, but anywhere from 100 to 500. Thi does not include coal trades; that is an unlimited number.

F. J. HOYLE.

Cincinnati, New Orleans & T. P.—Notwithstanding most energetic efforts to prevent a scarcity of cars during the cotton season, we are gradually falling short in our supply. To day we need about 200 box cars more than we have available. Our cars are delayed and diverted principally in the southeastern territory by roads that are not properly equipped. We favor demurrage, straight per diem and a penalty charge for misuse. S. O. PARKER.

Kansas City, F. S. & Memphis.—Short to day about 300 car to fill orders at local stations.

L. W. Towne.

Chicago, Burlington & Northern.—Short to-day 500 cars and there is a general shortage of cars on all of our connections.

JOHN J. MERRILL.

Minneapolis & St. Louis.—Short from 300 to 500 cars per day. Elevators on all divisions are full, and to keep them supplied would require at least 200 cars per day more than we can CLINTON BROOKE, give them.

ive them.

St. Paul, M. & Manitoba.—We are very short of cars; more than over before.

C. H. CANNON.

o than ever before.

Hannibal & St. Joseph.—We are very short of cars.

JOHN DUMBELL

Chicago, Burlington & Quincy and all connections etremely short of cars.

T. D. LINDLEY.

Blue and Canada Southern Lines.-The supply of cars is Blue and Canada Southern Lines.—The supply of cars is entirely inadequate to the demand under the present system of handling them. History repeats itself in this respect each fall for a period of about four months; but this season is worse than its predecessors. So far as our lines are concerned, our equipment, with proper handling, would take care of twice the tonnage we are moving. The reduced mileage per car per day, from year to year, for the past ten years, shows something wrong with the system rather than overproduction of equipments. GEO. A. GILMAN.

We have here the evidence that the shortage of cars is not confined to particular localities, but is general throughout the country; and the reasonable deduction is that the injurious effects of the present car service sys-tem, as I have outlined them, are now being felt alike by the railroads and producers of all sections of the country, Could a more favorable time than the present be selected by the railroads to inaugurate a proper system? To make this article complete, I append the views of some other well posted officers as to what this proper system should embrace, as written me within the past ten days:

S. M. PREVOST, Pennsylvania.

As far as my observation goes there is a general short-As far as my observation goes there is a general shortage of freight cars at present. That this exists just now is due partially to the general feeling of confidence and prosperity which prevails throughout the country, and to the fact that the public seem to no longer provide storage, but are determined to live from day to day depending entirely upon the service of the railroad companies. If there were but one railroad in this country, I think it is probable that that road would see that its patrons provided facilities at their own expense for the prompt loading and unloading of freight, whether at warehouses or at tracks owned by themselves or at shipping points on rivers or lakes—that the railselves or at shipping points on rivers or lakes—that the rail-road company would see that it had sufficient cars to move the tonnage offering, and would see that it had sufficient locomotives with which to move the cars, so that the maximum service could be gotten out of them. There being but one rail

vice could be gotten out of them. There being but one railroad company, there would be no car service question; but the demurrage question would be a very prominent one.

If all of the railway companies in this country should pass under the control of a syndicate or one central power, and per diem and demurrage charges were established. I have no doubt it would be found that the freight equipment of all the lines was far in excess of the tonnage, and in excess of the motive power and in excess of the station and terminal facilities, for from a central source the distribution of the cars would be made in such a way that until any particular road was sufficiently equipped with power or with terminal facilities, the number of cars sent to that road would be limited in accordance with its facilities to handle promptly. In other words, I number of cars sent to that road would be limited in accordance with its facilities to handle promptly. In other words, I think the syndicate would realize that the amount of money invested in cars was so great that it would at once become apparent that more money must be invested in facilities and in power, in order to enable it to get the full value of their investment in cars.

With the adoption of a per diem charge, either mixed or straight, as a basis of compensation for the use of freight cars, and with the adoption of a uniform demurrage charge invariably imposed upon all shippers and consignees at all points, whether competitive or non-competitive, and with the abolition

whether competitive or non-competitive, and with the abolition of the shipment to order system now prevailing, I feel thor ghly satisfied that the interests of the public at large, as well as of the railways, would be very materially benefited

Theo. Voorhees, New York Central.

I have no doubt that the remedy for the present shortage of cars is to be found in better movement. This will undoubtedly be secured by a more general adoption of the principle of payment for car service and use of track. I believe this end will be attained rapidly hereafter by the formation of Local Car Service Associations at competing points of all roads, and later by the adoption of a form of per diem car service for the use of foreign cars. foreign cars.

D. F. MARONEY, Balt. & Ohio.

In order to get the maximum service out of the freight equipment at such a time as this, when the traffic is the heaviest, a per diem charge should be collected from shippers who fail to load and unload cars promptly. Yards and ware-

house facilities should be enlarged so that all the traffic could be handled promptly, and the motive power should be in-creased to an extent which can only be determined by the volume of traffic.

C. B. Adams, Wabash

C. B. Adams, Wabash.

The shortage of cars throughout the West and, Southwest, and, in my opinion, the East also, is caused by allowing consignees to make storchouses out of the cars. For instance, there are now in the neighborhood of 10,000 cars tied up at St. Louis and East St. Louis with "Hold" freight. Consignees are holding this freight in cars either for sale or a higher market. This is the case of care, important point on our line are. ket. This is the case at every important point on our line except where Car Service Bureaus are in operation.

E. M. HORTON, Illinois Central.

E. M. Horton, Illinois Central.

We are in distress for want of cars. Am not sure that an endless supply of cars would help the general situation, as the storage capacity would only be increased thereby. The truth of the matter is, there are the largest general crops to be moved this fall and winter ever known in the history of this country, and none of the railroads are in condition to move the traffic as fast as offered. The larger portion of the crops, when heavy, seek an early market, and are offered for shipment at once, and the railroads probably could not handle them promptly even were they fully equipped with everything necessary for the needs of their general business. Shippers are n want to get it stored, and in the absence of storehouses they call for cars.

R. T. RENNIE, Delaware, Lack. & Western.

That there is a great scarcity of cars available for the transportation of freight at the present time is apparent. The cause is likewise apparent, and to my mind so easily overcome, that it is an astounding fact that an evil so far reaching in its effects has been allowed to assume the gigantic proportions which it has attained. My remedy would be straight per diem, by all means, demurrage charges and a fine for diversion-this would give us prompt release of cars through demurrage; accelerated movement by neg diem, and correct routing by fine. This would give us prompt release or cars through demurrage: accelerated movement by per diem, and correct routing by fine for diversion. I am at liberty to say that the management of the D., L. & W. will adopt per diem and enforce demurrage, if assured of concerted action by other roads.

Asa P. Blakeslee, Lehigh Valley.

There are a good many things to which the shortage of cars can be attributed—one, in particular, is the freight which comes to the Eastern market billed "to order" of consignors or unknown consignees to await sale. We have cars on our line now of this class which have stood for three months. If the Traffic Departments would get together, and put a stop to this manner of doing business the shortage of cars would be over ome to a great extent.

C. J. FELLOWS, C., C., C. & St. L.

C. J. Fellows, C., C., C. & St. L.

The situation here is serious, and has been for four months. It has been utterly impossible to keep up with our orders. A good deal of our trouble is due to the fact that the Southern country has been opened up so extensively; in fact, roads have been built much faster than cars have been supplied, and in consequence when our cars go south it takes weeks and months to get them back. Another great source of delay is that many roads order cars for anticipated business. We have to-day 250 cars on a Southwestern road that were ordered more that many roads order cars for anticipated business. We have to-day 250 cars on a Southwestern road that were ordered more than 30 days ago for business. The reason given for not returning cars promptly is that the freight has gone this year by water routes. Shipments of hard coal also delay cars, and it is not unusual to find cars under the same load for 90 days. Certain roads agree with consignees, if they will ship by their line, they will be permitted to hold cars indefinitely. I can see no remedy for these detentions except a per diem charge of about 50 cents per day. This might work a hardship on some roads, but it would stimulate the movement of cars 50 per cent. The Car Service Associations will cover the large business centres, but are not far-reaching enough to prevent such delays as are but are not far-reaching enough to prevent such delays as ar refer. ed to above.

G. K. COOKE, N. Y., L. E. & W.

The practical application of demurrage and per diem chars The practical application of demurrage and per diem charges would place all Trunk Lines, at least, in a position to fill orders in the busiest season without calling upon neighbors. The freight equipment of the country is, if anything, too large. The low average mileage per day and the high average detention per car, proves that we need not more cars, but universal demurrage and per diem. The Erie has suffered the loss of much valuable business from inability to supply the unprecedented demand for cars, notwithstanding the fact that we have more than 30,000 freight cars, all in active service. We might go on adding to this enormous equipment until it. We might go on adding to this enormous equipment until it was doubled, and yet the shortage at certain seasons would be just as great, unless something is done to prevent the long ns which tie up about two-thirds of the equipr

J. W. BURNHAM, Fitchburg.

J. W. BURNHAM, Fitchburg.
The shortage is not due to insufficient cars, but to the lax movement, principally in the South and extreme West. The small roads having but few cars hold the cars of the larger systems for local business. The remedy lies in per diem and demurrage charges, with a penalty for diversion.

It will be observed that there is great unanimity of thought as to the cause of the trouble, and that relief will come quickly through the adoption of a system of per diem and demurrage charges, with a penalty for diversion. The essence, therefore, of this article is the confirmation of the fact that the present mileage system of settlements for car service is based upon a wrong business principle, which in its effects is disastrous to interests of the railroads and the producer; that matter is susceptible of administrative reform; that the present is the opportune time to act; and finally, that the true line of action is mapped out by officers who are so thoroughly conversant with the whole subject as to leave no doubt as to the correctness of their ews. The great magnitude of the economy to be cured for the railroad interest, and the growing necessity of action to meet their requirements as common carriers, place this question before the executive of-ficers as one well worthy of attention.

W. G. Wattson.

Sections of Scrap and Fagot Axles.

Some of the advances made in the manufacture of wrought iron axles can be most readily seen from an in-spection and comparison of the cuts herewith, taken from the sections of the metal and etched with acid. Fig. 1 shows the ordinary scrap axle as made without special care in the disposition of the scrap throughout the length of the axle. Fig. 2 shows a section of a specially con-



Fig.

structed axle, in which the distribution of the fibres is carefully arranged according to the process of the Patent Shaft & Axletree Co. The iron used to make these axles is of the same class as Lowmoor iron, and after being rolled into bars of the same general section as shown in the cut, it is packed into fagots and reduced by working to the required size. The amount of the reduction can be seen from the centre bar in the axle, which is made in the original  $2\frac{1}{2}$  in. in diameter. The cut is about 0.63 of the full size.

A recent test of one of the patent fagoted axles at the United States Arsenal at Watertown, Mass., for the Boston & Albany, shows a uniform tensile strength of 48,000 to 49,000 lbs. throughout its entire length. The manufacturers test each lot of axles before shipping, as

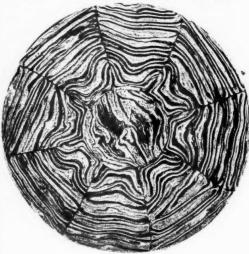
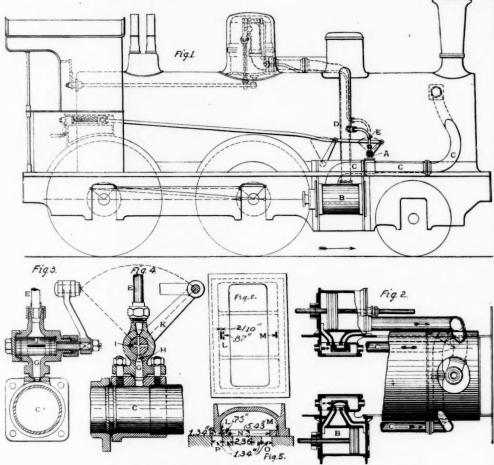


Fig.

follows: The sample axle is placed on bearings 3 ft. 6 in. apart, a 20-ton weight is dropped on the centre and the blows repeated until the collars meet; no fracture or flaw must show under this test, or the lot is rejected. Better axles are now used under railroad cars than ever before, and the strict attention being paid to the proper selection of material, and the care demanded in the manufacture, has resulted in the production of a quality of forged iron for driving and truck axles, rods and other locomotive details, which has been previously almost unknown and unavailable at reasonable cost.

Lindner Starting Valve for Compound Locomotives.

In the case of the compound locomotive it is necessary that steam should be admitted to the low-pressure that steam should be admitted to the low-pressure cylinder in order that heavy trains may be started with facility, when the crank pins of the high-pressure cylinder are at or near a dead centre. One of the latest devices for the proper regulation of the admission of high-pressure steam to the low-pressure cylinder is illustrated herewith. It is in use on the Saxony state rail-scale in Corporate and here in operation given most exroads in Germany, and has in operation given most ex-cellent results. With equally good operation, its sim-plicity recommends it. With the device illustrated herewith, the steam, by means of a small pipe leading directly from the high-pressure steam pipe, fresh boiler steam is admitted directly to the receiver, and from thence to the low-pressure cylinder through the valve A as shown in fig. 1, in which B is the high-pressure cylinder, C the receiver, D the steam pipe to the



THE LINDNER STARTING VALVE FOR COMPOUND LOCOMOTIVES

high-pressure cylinder, E the short pipe making conhigh-pressure cylinder. E the short pipe making connection between the main steam pipe and the receiver. Fig. 2 is a plan of the same showing the connection to the low-pressure cylinder. Fig. 3 is the longitudinal section of the admission valve, and fig. 4 is a cross section of the same. E in these figures is the steam entrance pipe, and G the discharge passage into the reservoir C. H and I are passages connected with each other and at right angles in the plug J, which is rotated by the arm K connected with an extension on rotated by the arm K connected with an extension on the reach rod, as clearly indicated. When the reverse lever is in full forward gear, the passage  $\boldsymbol{H}$  is in connection with  $\boldsymbol{G}$  and the receiver  $\boldsymbol{C}$ , and when in full backward gear, the passage I forms the connection. This is accomplished by regulating the length of the crank K until it will move 90 degrees, when the link motion is reversed. This is the manner in which the fresh boiler steam enters the receiver, from whence it reaches both the high and low-pressure pistons. In order that the locomotive may be properly started, when both ports of the high-pressure cylinder are covered by the steam valve, it is best that the counteracting pressure on the high-pressure piston, brought about by the admission of steam to the receiver, be relieved at the time of starting. To accomplish this years ingenious plan has been adorted in the construction. a very ingenious plan has been adopted in the construc tion of the high-pressure steam valve. Fig. 5 and fig. 6 show a section and plan of the steam valve in the high Fig. 5 and fig. 6 pressure steam chest. In this valve are passages L and M. These passages connect the exhaust port of the high-pressure cylinder with the steam port of the same, as clearly shown on fig. 5, whenever one of the steam ports is closed. The width and location of the small ports I and M are such that when the edge of the valve toucher the edge of the steam port, as at cut off, they commence to open, and when fully open the distance which the steam valve overlaps the edge of the port is just equal to their width. Thus whenever the steam valve covers a steam port the steam in the receiver can pass over through the small passages L and M and through the steam port that is open with the receiver, and allow practically the same pressure to exist on both sides of the high-pressure piston. That is, these ports are so arranged that steam from the high-pressure steam chest cannot go over into the exhaust pipe, yet the steam which is let into the receiver through the pipe E, and which would otherwise act to prevent the starting of the engine by entering on the wrong side of the high-pressure piston, entering on the wrong side of the high-pressure piston, through the exhaust port N and steam port O, can thus reach both sides of that piston by reason of the proper arrangement of the passages L and M. In the illustration it is the passage L that is in the acting position and is admitting steam from the receiver through the port P, resulting in the same pressure on both sides of the high-pressure piston, when, as in the position shown, the ports to the high-pressure cylinder from its steam chest are closed, this being the most difficult posi-

ing the ordinary locomotive it is customary to throw the reverse lever full forward, and this is the position in which this starting gear is put into action, and through the small pipe E boiler steam is gradually, not suddenly, admitted into the low-pressure cylinder, and because of this slow admittance there is no danger of their size, needs to be fracture—of what, by reason of their size, needs to be lightly built reciprocating parts—as a result of the sud-den impact of heavy pressures. It will be readily under-stood that the most difficult position in which to start a compound locomotive, even when provision is made for the entrance of high-pressure steam into the lowpressure cylinder, exists when the steam valve covers the ports into the high-pressure cylinder. It is at this time that this starting gear be-comes most useful, as hereinbefore stated, by balance ing the pressure on both sides of the high-pressure ton and admitting fresh boiler steam to the low-pr ure piston. As soon as the locomotive starts and the -pressure cylinder exhausts, it will commence to work high-pressure cylinder exhausts, it will commence to work compound regardless of the fact that the admission valve may continue to admit high-pressure steam into the receiver. This continued admission is in nowise detrimental, occasioning only a very small loss, if any. As soon as the locomotive is hooked up everso little, and the cut-off thereby decreased to a very small extent, the admission valve is closed by reason of the closing of the ports H or I, as the case may be. Such construction as this recommends itself because of the simplicity of all the connections, the accessibility of the parts, and the ease of locating the device. No additional handles are required in the cab, and, while it is automatic, it yet has complication of parts to require frequent repairs.
c case of the reversal of the engine while going ahe steam is immediately admitted to the receiver, and there steam is immediately admitted to the receiver, and there-from enters the high-pressure cylinder and acts as a lu-bricant, and also as a brake upon the engine by reason of its action on the piston of the low-pressure cylinder. The receiver has a safety valve which does not allow the pressure to rise above one-half of that of the boiler. The small steam channels in the high-pressure steam valve shown at L and M for 5 are so minute as in nowise to shown at L and M, fig. 5, are so minute as in nowise to affect the appearance of the indicator card except at the lowest speed, and consequently they are practically in effectual after the locomotive has commenced to work compound. The effect of the action of these ports is fur ther decreased by their location, which is such that a the time when they act the valve is moving with the greatest rapidity, thus reducing the time of their action. Fig. 1 shows the position, by dotted lines and full lines, of the crank positions at which the small auxiliary passages L and M are efficacious in assisting the driving of the engine. These points lie not far from 50 degrees distant from the dead point. An interesting advantageous feature of the operation of this mechanism results from a peculiar action of link gears in full throw. A slight change in the position of the reverse lever, and consecutive the results from the transfer the links results from the change in the position of the reverse lever, and consecutive the results from the change in the position of the reverse lever, and consecutive the results from the change in the position of the reverse lever, and consecutive the results of the change in the position of the reverse lever, and consecutive the results of the change in the position of the reverse lever, and consecutive the results of the change in the position of the reverse lever, and consecutive the results of the change in the position of the reverse lever, and consecutive the results of the reverse lever and tion in which to start a compound locomotive. In start- quently the reverse shaft, when the links are about in

full gear, produces little or no change in the cut-off, yet such a slight chance is more than sufficient to close the entrance ports through the admission valve A. In cases actually tried the admission valve was arranged to be fully opened when the cut-off was 80 per cent., and it was found to be fully closed when the cut-off had been re. duced to 75 per cent.

#### Shop Notes in the Northwest.

CHICAGO, MILWAUKEE & ST. PAUL.

The South Minneapolis shops of the C., M. & St. P. are called upon to keep in repair a large number of loco notives and cars, those of all the divisions centering at Minneapolis, and are the most extensive in the neighborhood, employing nearly 700 men. In the absence of Mr. John Taylor, the master mechanic, it was quite impossible to obtain the desired information on many

shops are all built of brick and stone and admirably laid out, consisting of machine and erecting shop, blacksmith shop, tin shop, boiler shop, car shop, wood-working shop, and paint shop. Here, also, is a large storeroom with the offices, and extensive sheds are being erected for use in connection with freight car repairs.

A very noticeable feature about all the buildings is the ample amount of light afforded in the daytime, and for night work incandescent electric lights leave nothing for night work incandescent electric lights leave nothing to be desired. All the shops are heated by steam, and a large plant of fire pumps and an extensive system of pipes make the chances of a destructive fire small. A system of signals and assignment of the employés to definite duties in the event of a fire is in force.

definite duties in the event of a fire is in force.

Upon entering the erecting shop, one is at once attracted by the unfamiliar design of the machine tools, which upon closer examination prove to be of English make from the works of Sharp, Stewart & Co., Manchester; Fairbairn, Kennedy & Naylor, Leeds, and others. That some of them appear extremely clumsy can readily be imagined, and it is somewhat surprising that such selections should have been made in preference to the handy tools of home manufacture, more completely adapted to the precise requirements of native rolling stock. This shop is full of locomotives undergoing repairs, which work is complicated to a considerable extent by the great diversity of designs among the various locomotives. Some of the engines must have had inous locomotives. Some of the engines must have had in-teresting histories. One in particular still carries a builder's plate with "Breese Kneeland & Co., Jer-sey City," inscribed thereon. All the work is apparently carried on very systematically and rapidly, how-ever, and in view of the large number of engines being repaired and evident pressure to get the work done with the least possible delay, the neatness and order pervading the works were particularly noticeable.

A large transfer table between the locomotive and car shops is operated by means of a narrow-gauge locomo-tive which carries on one side a small vertical engine operating through a horizontal shaft the winding apparatus for running the rolling stock on and off the table.
The whole arrangement is very complete, performing its work with great rapidity.

. The car and wood-working shops are extremely well arranged and fully equipped with modern appliances. A complete system of fans and pipes convey all shavings to

the boiler room for fuel.

The smith shop is unusually large, and is fully equipped with modern hammers, punches, etc., in addi-

on to 21 forges.

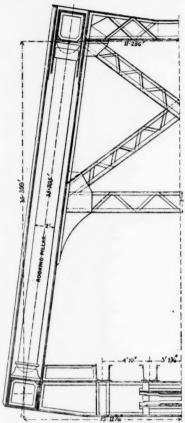
Altogether these shops are well worth a visit by any person interested in such matters. Their accessibility makes it very easy for one who has a couple of spare hours in the city to spend the time profitably and pleasantly.

CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA

ops of this line are located in St. Paul, and are used for locomotive repairs only. They consist of a large erecting and machine shop, boiler shop and blacksmith shop. The offices are in the erecting shop, and, in addition to the buildings mentioned there is a large storeroom, an oil-house, and a 30-stall roundhouse. All the buildings are of brick, well lighted, and are heated by

The arrangement of the erecting shop is that which is most common in this country, the engines being received from the transfer table on one side, which is occupied entirely by the tracks and pits. Here they are stripped; the various parts, after being marked, are placed on racks alongside or passed across the shop, where are located the various machine tools. The facilities for making repairs quickly and systematically are good, and the shop is crowded with work.

The standard passenger locomotive is of the usual American type, also used in freight service; the standard freight locomotive is of the ten-wheel class, and for switching a six-wheel coupled engine is used. They are from the works of various well-known makers, but the majority of those recently purchased are from the Sche-nectady Locomotive Works. Two of these, a passenger and a switcher, were particularly noticeable for their; fine appearance. The first has cylinders 18 in. by 24 in.; drivers, 66 in. in diameter; wagon-top boiler, 54 in. at barrel; total heating surface, 1,575 sq. ft. The weight in working order is 92,500 lbs., with 61,000 lbs. on the drivers. These engines are said to be giving excellent results in heavy express service. The switching engine



1.-Cross-Section of Girder,

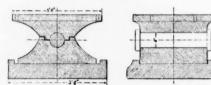
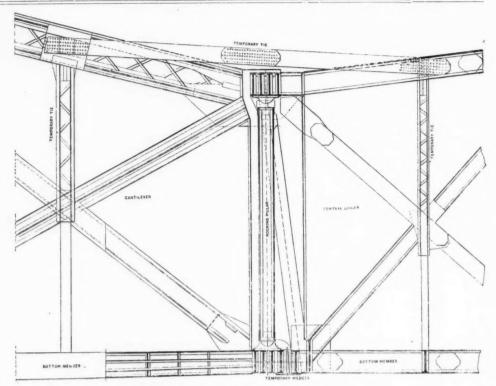


Fig. 3.-Bed Plates and Pin for Junction of Girder and Cantilever

has cylinders 18 in. by 24 in.; drivers, 50 in. in diameter, and straight 50-in. boilers; total heating surface, 1,007 sq. ft.; weight in working order, 78,000 lbs. These have eight-wheel sloping tanks of 2,250 gals. capacity. The new ten-wheel freight engines from the same makers have cylinders 18 in. by 24 in.; drivers, 50 in. in diameter; wagon-top boilers, 50 in. at barrel; total heating surface, 1,436 sq. ft.; weight in working order, 98,000 lbs., with 74,600 lbs. on the drivers. 74,600 lbs. on the drivers.

All the motive power and rolling stock is kept up to a good standard, and is in charge of Mr. Matt. Ellis, Master Mechanic, assisted by Mr. John Ellis.



Junction of Central Girder and Cantilever.

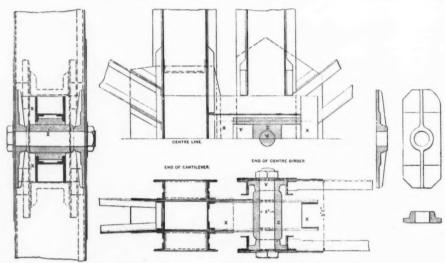


Fig. 4.-Details of Junction of Central Girder.

FORTH BRIDGE-ERECTING AND JOINING THE CONNECTING SPANS.

All the motive power and rolling stock is kept up to a good standard, and is in charge of Mr. Matt. Ellis, Master Mechanic, assisted by Mr. John Ellis.

Master Mechanic, assisted by Mr. John Ellis, Master Mechanic, and the side of the Connections were successful or of the Connection, between the Mr. John Ellis, Mr. John Ellis, Mr. John Ellis, Master Mechanic, and the side of the Connection with the Will to describe the design of the central girders and their permanent connection with the ends of the cantilevers. The practical of the central girders with cross-girders are each composed of two side girders with cross-girders are each composed of two side girders with cross-girders are each composed of two side girders with cross-girders are placed in the side of the cantilevers. The produced by the control of the cantilevers, The length of each is 30 ft., the depth at the centre is 31 ft. 5 ft., and that the sides and of the sales and of the sales and the sides and of the sales and the sides and of the sales and the sides and

bed-plates on steel base plates. It is controlled by an arrangement of bolt and block similar to that at the other end of the girder already described, but the faced side of the tongue projecting from the cross-girder of the cantilever does not admit of any longitudinal movement.

other end of the girder already described, but the faced side of the tongue projecting from the cross-girder of the cantilever does not admit of any longitudinal movement.

The first operation in building the central girders was to attach a stage to the undersides of the end of the cantilevers, sufficiently large and strong to permit of the building thereon of the end post and adjacent half of the first bay of the central girder. On account of the end post of the central girder. On account of the end post of the central girder. On account of the end post of the central girder being inclosed on three sides within that of the cantilever, it was necessary to put this part together and rivet it in a position in advance of its ultimate site, and when this was done to thrust it back until it rested either on the long rocking posts or upon the bed-plates, according to which end of the central girder was being operated upon. As soon as these first half-bays had been thus placed and adjusted in their ultimate positions, their top members were attached to the top members of the cantilevers by heavy ties (fig. 2), one on each side of each girder, there being four in all at each end of each central span. These ties were composed of three flat plates, 50 ft. long, 26 in. wide and ½ in. thick. The attachments at either end were made partly by rivets and partly by turned bolts sufficiently numerous to make them of ample strength. The calculated stress on each of these ties at the maximum is about 290 tons. Similarly the continuity of the compressive stresses between the lower members of the cantilever and of the central girders, while the latter is a prolongation of the former, is secured by two steel wedges interposed between faced steel frames attached to the end of these bottom members. These wedges are 3 ft. long, 8 in. wide and tapered from 5 in. to 1¼ in. in thickness. The thrust upon them at a maximum, including the effect of winds, is about 500 tons. These temporary connections having been made, and the crane used in

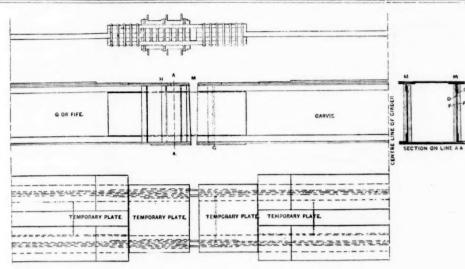


Fig. 5.—Temporary Plant for Erecting Central Girders.

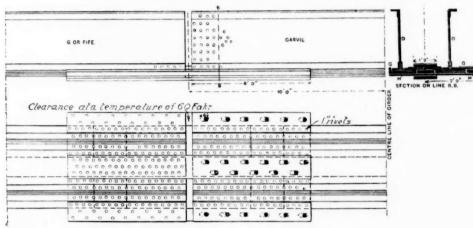


Fig. 6.-Temporary Connections for Bottom Boom of Central Girders. FORTH BRIDGE-ERECTING AND JOINING THE CONNECTING SPANS.

FORTH BRIDGE—ERECTING AND JOINING THE CONNECTING SPANS,

from that point to the bottom member was put in place, the struts were then extended for their whole length, in the struts were then extended for their whole length, in the consequence of the control girders, which well have been connected—the structure between the consequence of the structure between the cross-girders a bay, 40 ft. in length, in some cases has not exceeded 59 working hours. A slight variation, which, as a rule, was the last thing done in each half by which the cross-girders were placed in position, which, as a rule, was the last thing done in each half by which the cross-girders were placed in position, which, as a rule, was the last thing done in each half by which the cross-girders were placed in position, which, as a rule, was the last thing done in each half by which the cross-girders were placed in position, which, as a rule, was the last thing done in each half by which the cross-girders were placed in position, which, as a rule, was the last thing done in each half by which the cross-girders were placed in position, which, as a rule, was the last thing done in each half with the ends of the welso of the welso of the welso of the welso of the canting the portation of the canting the operation in part of the propagation of the canting the operation in part of the propagation of the canting the operation in part of the part of the propagation of the canting the operation of the same thickness. At the Garrie end these hick plates a placed, as shown, three plates of about the same thickness. At the Garrie end these hick plates are placed, as shown, three plates of about the same thickness. At the Garrie end these hick plates are placed, as shown, three plates of about the same thickness. At the Garrie end these hick plates are placed, as shown, three plates of about the same thickness. At the

#### A Spike Which Struck a Snag.

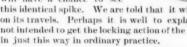
A Davies' steel spike, which was being driven into a

sound yellow pine tie the other day, struck a stub of an old spike with the result shown in the cut herewith.

The point was bent into an almost perfect circle without starting a check in the spike. Not a flaw can be seen in the The bright line metal. shown near the top is merely the artist's effort to accentuate a roughness left in cutting the spike. The tough-ness of the steel and its ca-pacity to stand abuse are well shown. This spike was made by the Troy Steel & Iron Co., and is one of a lot made for the New York Central & Hudson River.
The cutting action of the

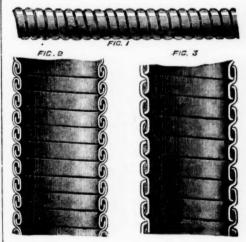
spike in a close-fibred wood is also well shown. The fibres are sheared off clean, with no displacement. In that particular our picture is a very faithful reproduction. The cleanness of the cut is not a bit exaggerated. No doubt many of our readers will have a chance to see

this identical spike. We are told that it will soon start on its travels. Perhaps it is well to explain that it is not intended to get the locking action of the Davies's pike



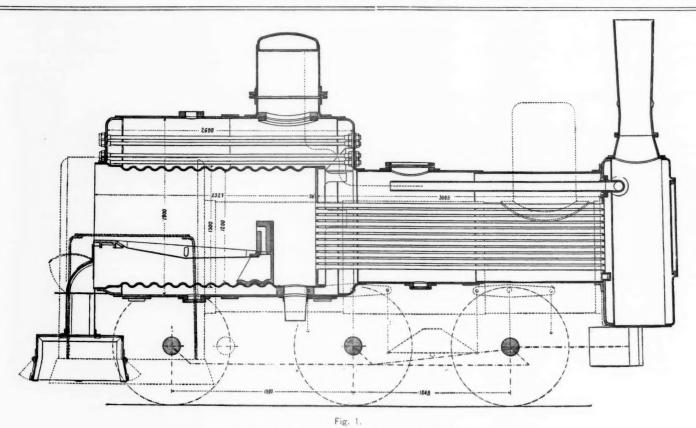
#### Flexible Metallic Tubing.

A really flexible metallic tube is sufficiently a novelty to make it of interest on that account alone. The tube illustrated by the accompanying engravings may, how-ever, claim attention because of its practical usefulness. The engravings are made from 14 in, and 1 in, tubes. The smaller one will easily coil around a circle of 5 in., and the larger tube will coil to a radius depending upon the form adopted, which is chosen with reference to the work to be done. Fig. 1 is an exterior view of a piece of the small tube, and fig. 3 is a section of a piece of the larger made in the same way.



It will be seen that the tube is made from a continuous strip of metal pressed into a section something like the letter S, and that this continuous strip is colled upon itself in such a way that the parts of its section inter-lock. The form of the section, shown at fig. 3, is that adopted for the smaller tubes, and those requiring a good deal of flexibility, as it leaves a small space between the edge of the strip or spiral coil on one edge, and the space in the groove into which it fits, for the introduction of a continuous thin thread of india rubber of fine quality. This is automatically fed into the spiral coil as it is made. It is completely encased and makes the tube quite tight when considerably bent, and used for gases quite tight when consideranty bent, and used for gases and liquids under small pressure. For steam and for water under very heavy pressures, the section shown in fig. 2 is used. The flexibility of this section is not so great, although it is sufficient for most purposes, and the liquid under pressure causes the coils to press tightly together and make themselves perfectly tight. The tube is about the same weight as india rubber tube of the same strength, and is made by continuous-action machinery at a very great speed. It seem to be applicable for most of the pur-poses for which india rubber tubing has been used, and for many it will no doubt prove superior, and stand heavy and rough work better. It will not do for that work and those situations where, as in a laboratory, a piece of % in. tube has to accommodate its ends to fit anything be tween jarin, and % in., but this sort of thing so one of the few for which it will not do.

The tubing being a spiral or screw, its ends are readily attached to end fittings, which are made of various



KNAUDT AND POHLMEYER'S LOCOMOTIVE BOILER

## Knaudt and Pohlmeyer's Locomotive Boiler.

Messrs. Schulz, Knaudt & Co., of Essen, have constructed a new form of locomotive boiler for the Prussian state railroads. This firm makes corrugated flues, and has introduced such flues for the fire box of this boiler. The designs are the joint production of Herr Knaudt and the Prussian Railroad Director, Herr Pohlmeyer.

The locomotive to which this boiler is applied is a sixwheel freight engine, 16-in. × 22-in. cylinders. The old boiler had 65 sq. ft. of heating surface in the fire box,

0 0 Fig. 2.

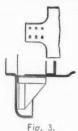
and 964.5 sq. ft. in the tubes, or a total of 1,029 sq. ft-The new boiler has a total heating surface slightly in excess of the old amounting to 1,057 sq. ft., of which 108.7 are in the fire box and 948.3 in the tubes. The form and position of the old fire box are indicated by dotted lines in fig. 1 and by the left-hand part of the section in

forms for the different applications. The tubing is manufactured by the Flexible Metallic Tubing Co., and is made of copper, brass, or gun metal.—The Engineer.

Knaudt and Pohlmeyer's Locomotive Boiler.

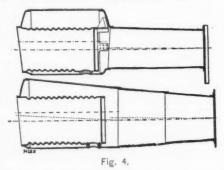
The tubing is of a cylindrical fire-box shell of 6 ft. 2% in. inside diameter, built up of %-in. plates, and 8 ft. 5 in. long, with a barrel 3 ft. 10% in. in diameter, built of \$\frac{1}{4}\dark{2}\dark{1}\dark outside diameter, with a flanged tube-plate, 1 in. thick,

PRUSSIAN STATE RAILROADS.



inserted at the end, and the barrel contains 187 tubes 1¾ in. inside diameter. The tube-plate end of the furnace flue is attached to the shell by means of four gusset stays, see figs. 1, 2 and 3, and the front and back outside firebox plates are tied by 14 longitudinal bolts.

The results of working of this locomotive on freight traffic between Deutzenfeld and Eitorf with trains aver-aging 91 axles are, according to the report of the officials of this section, that the locomotive develops steam more readily and maintains it better than the old boiler, but with an increased fuel consumption, which is attributed to the fact that the new boiler requires more fuel to get up steam. On inclines ranging from 1 in 800 to 1 in 300



on part of the line, the driver can keep both water and steam steadily, and also reach his destination at the proper time, although having to use the injector constantly. On this journey the boiler evaporated 1,150 gal-

lons of water, using 2,640 lbs. of coal, inclusive of getting up steam. The time occupied in mading the run is unfortunately not given in the report.

Objections have been raised by the officials to structural details, such as the position of tanks, etc., and it is observed that the heat radiated from the boiler was incovernient. In reference to these criticisms the convenient. convenient. In reference to these criticisms, the cona fig. 1 and by the left-hand part of the section in g. 2.

As will be seen from these figures the boiler consists require more fuel for getting up steam, but will keep steam

better, and they remark that no complaints have been made about priming, though the steam space is only 50 cu. ft. and the water surface 43 sq. ft., the barrel being completely filled with water. If priming did take place, it would certainly have shown itself when working the by Messrs. Schulz, Knaudt & Co. for locomotive boilers with corrugated flues, the former to do away with stay-bolts for the fire-box shell, and the latter to build barrel and box in one structure, without any stays or front

We are indebted to Engineering for this information, and those interested in a further description of this loco-motive will find it on page 397 of that publication for Oct. 4.

### Formulas for Springs.

One of the most troublesome classes of formulas to find and comprehend when one is not constantly using mathe matics are those relating to springs. The table herewith shows the formulas used by the Pennsylvania Railroad. They are deduced from calculations by Reuleaux, and modified to meet somewhat the demands of railroad en-gineering. This table will be found particularly useful to all railroad draughtsmen.

### The Robert Process.

The real value of the Robert process for making steel, is still a matter of dispute. Mr. Henry M. Howe, in his work on metallurgy, the publication of which, in the Engineering and Mining Journal, was lately finished, speaks unfavorably of it, and sees no advantages in it over the ordinary Bessemer. On the contrary, several experts in metallurgy express their confidence in a development of the process which will result in the production of a class of uniform steel castings which has duction of a class of uniform steel castings which has hitherto been almost unknown, and castings are now exhibited of high tensile strength, free from blowholes, and made with intricate shapes and thin parts that could not have been produced with the ordinary Bessemer process. The chief questions now seem to be, Can such castings be made at every blow? and will the

Can such castings be made at every blow? and will the different blows or heats be uniform?

An interesting article by Mr. T. W. Robinson, chemist for the Illinois Steel Co., at Joliet, Illinois, in a recent number of the Iron Age gives some facts with regard to the Robert process as carried on at Stenay, France. Some extracts from that article follow:

Some extracts from that article follow:

It was with a good deal of skepticism that I viewed the Robert exhibit at the Paris Exposition. If to be credited, it was a surprising example of the capabilities of pneumatic steel for castings, and showed some wonderful results in the combination of malleability, toughness and freedom from blowholes.

At a plant in the vicinity of Paris the pig that they were using in the cupola was a Bessemer iron of a good No. 2 grade, not specially hot, and was melted with a fuel consumption of about 1 lb. of coke to 6 of iron. The vessel was blown at about 6 lbs. pressure through five slightly converging horizontal tuyeres set in at the side and was turned by hand. \* \* \* The metal poured into a small hanging ladle is remarkably hot and is cast with ease, even after standing a length of time that would render it impossible with ordinary Bessemer steel. They recarburize with ferro-manganese with an addition of ferro-silicon. \* \* \* The pieces which I

#### CALCULATION OF SPRINGS BY F. REULEAUX.

MATERIAL DETERMINED BY PENNSYLVANIA BAILBOAD TRETS

G =Modulus of elasticity for torsion.  $G = {}^{\circ}_{\circ} E = 12,600,000$  lbs. per sq. in. (steel). = 6,000,000 " (brass).

No.	Form of spring.	Name.	Max. load.	Deflection.	Flexibility.	Volume.	Proportion of vol.	Remarks.
1	M	Rectangle spring, cu- bic parabolical.	$P = rac{8BH^z}{6L}$	$F = \frac{6 P}{EB} \frac{L^3}{H^5}$	$\frac{F}{L} = \frac{SL}{EH}$	V = % L H B	25.2	Formula for cubic parabolical shape, $\frac{Y}{H} = \sqrt{\frac{X}{L}}$ . Instead of this, trapezoidal height of end = $\frac{9}{26}H$ .
3	1	Common triangular spring.	$P = \frac{SBH^2}{6L}$	$F = \frac{6 P L^3}{E B H^3}$	$\frac{F}{L} = \frac{SL}{EH}$	$V = \frac{L H B}{2}$	1	In practice this spring will be made strong er at ends when a eye or gib is used.
3 .	do the	Compound triangular spring.	For a single and double elliptical spring the max. load = $\frac{2P}{E}$ . $P = \frac{SNBH^2}{6L} = \frac{SB^1H^2}{6L}$ $N = \text{number of leaves}$ .	Deflection of a double elliptical spring = $\frac{2}{F}F$ . $F = \frac{6}{F}\frac{P}{L^3}\frac{L^3}{E}\frac{B}{B}\frac{H^3}{H^3}$	$\frac{F}{L} = \frac{S}{E} \frac{L}{H}$	$V = \frac{NLHB}{\frac{2}{2}}$	1	This spring will carry same load as spring No. 2 when B <sup>1</sup> i N B, as shown is dotted lines.
4		Spiral winding spring, flat.	$P = rac{SBH}{6R}$ $R = \text{radius}.$	$F = R \alpha = \frac{12 P L R^2}{E B H^4}$	$\frac{F}{R} = \frac{2 S L}{E H}$	V = L H B	1	$L = \text{length of leaf.}$ $\alpha = \text{angle of torsion b}$ $\log P$
5	queen .	Helical winding spring, flat.	For square $B=H$ . $P=\frac{SBH^{s}}{6R}$ $R={ m radius}.$	$F = R_{A} = \frac{12 P L R^{3}}{E B H^{3}}$	$\frac{F}{R} = \frac{2 S L}{E H}$	V = B H L	1	Bending strain for each section allk for springs Nos. 2, 3 4, 5 and 6.
6	TETEGE	Helical winding spring, round.	$P = \frac{S \pi D^3}{32 R}$	$F = R \alpha = \frac{64 P L R^2}{\pi E D^4}$	$\frac{F}{R} = \frac{2 \ S \ L}{E \ D}$	$V = \frac{D^* \pi L}{4}$	1	See Fig. Ends of the rect angular leaf are to tapered it thekness H.
7		Common torsion	$P = \frac{8 \pi D^2}{16 R}$ $R = \text{radius},$	$F = R \alpha = \frac{34 P R^2 L}{\pi G D^4}$	$\frac{F}{R} = \frac{2 S L}{G D}$	$V = \frac{D^2 \pi L}{4}$	125	Torsion strain for each section alike for eprings No. 7, 8, 9 and 10.
8	i o c	Common torsion spring, flat.	$P = rac{S}{3R} rac{B^{2}}{\sqrt{B^{2} + H^{2}}} \ H > B$ , nearly, $S rac{B^{2}}{3R} rac{H^{2}}{4R^{2}} \ P = rac{S}{3R} rac{B^{2}}{R} rac{H^{2}}{4R^{2}} \ H > B$ , $[0.4] \ B + 0.96 \ H]$	$F = R \alpha$ $= \frac{3 P R^2 L [B^2 + H^2]}{G B^3 H^2}$	$\frac{F}{R} = \frac{SL}{G} \frac{\sqrt{B^2 + H_2}}{GBH}$	V = B H L	%	See spring No. 3, maload = 2 P; defletion = 2 F.
9	1888 1888 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Helic'l torsion spring round.	$P = \frac{S \pi}{16} \frac{D^2}{R}$	$F = \frac{2 R S L}{D G}$ $F = \frac{32 P R^2 L}{\pi G D^4}$	$\frac{F}{R} = \frac{2 S L}{G D}$	$V = \frac{D^2 \pi L}{4}$	ń	$L=3 \pi R M$ . $M=$ number of coile
10	COCCOOL.	Helic'l torsion spring flat.	$P = \frac{S B^{2} H^{2}}{3 R \sqrt{B^{2} + H^{2}}}$ $H > B, \text{ nearly.}$ $S B^{2} H^{2}$ $P = \frac{S B^{2} H^{2}}{3 R [0.4 B + 0.96 H]}$	$F = \frac{5PR^3L B^2 + H^3 }{GB^3H^3}$	$\frac{F}{R} = \frac{SL}{G} \frac{\sqrt{B^3 + H^3}}{BH}$	V = B H L.	96	
11	The state of the s	Conical spiral torsion spring, round.	$P = \frac{8 \pi D^3}{16 R}$	Nearly $F = \frac{16 P R^2 L}{\pi G D^4}$	$\frac{F}{R} = \frac{SL}{GD}$	$V = \frac{D^* \pi L}{4}$	5	See spring No. 3.
12	100000	Conical spiral torsion spring, flat.	$P = \frac{S B^2 H^2}{3 R \sqrt{B^2 + H_2}}$ $H > B, \text{ nearly.}$ $P = \frac{S B^2 H^2}{3 R (0.4 B + 0.96 H)}$	Nearly $F = \frac{3 P R^{z} L [B^{z} + H^{z}]}{2 G B^{3} H^{2}}$	$\frac{F}{R} = \frac{S L \sqrt{B^2 + H^2}}{2 G B H}$	V = B H L.	5 4	See spring No. 3, ma

W = 0.28 lbs, per cub. in. (steel). W = 0.31 lbs, per cub. in. (brass). To find weight of spring multiply V with W. Static load for which spring is intended to be 50 per cent. of max. load P. [P. R. R. Co.] F = deflection of spring under max. load P. Proportion of volumes considering the form of No. 2 spring as unity.

For springs with many leaves the second leaf will be kept as long as the first leaf, or when eye is used for a double elliptical spring. The leaf will be kept as shown to make ends stronger; the leaves are also provided with nibs and grooves.

Steel of high elastic limit and low modulus of elasticity is the most economical in weight required for helical springs. The bar of helical spring has to be tapered at ends to  $L+2R\pi$ .

saw made and that were lying around the foundry, though not free from blowholes, had few compared with Bessemer castings and were remarkably tough. A sample of the steel taken for analysis had the following composition:

Carbon, 0.129 per cent.; silicon, 0.150 per cent.; manganese. Per cent.

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Description of the basic pig discharacter is indicated by the following analyses:

Silicon.

Per cent.

Per cent

					b	 						 P	orbon 0.08 0.12		Silicon. Per ct. 0,009 0.006	Pho phor Per 0.0 0.0 0.0	us. ct. 19 65	Manganese. Per ct. 0.30 0.40 0.86
	4	. 1		ø.			i.	2	-3		. 1		2	. 1	for	4 1-	A	. 1

Considering the trying form, the most striking casting shown was a propeller-blade similar to one that was at their exhibit at the Paris Exposition. It was very smooth and perfect and remarkably free from blowholes. A cracked or imperfect casting, if expensive, is repaired by heating and welding. I saw a broken bar welded in an ordinary blacksmith's forge almost with the ease and perfection of wrought iron.

The results of actual practical work as I saw them in France certainly indicate something more than common Bessemer steel and analysis does not explain the difference any more satisfactorily than it does that between open-hearth and pneumatic metal. The physical characteristics, as shown by the tests of the French Navy Department, are striking, and should further proof be needed one has only to note the cinder, fluidity and comparative quietness of the metal in casting to detect the dissimilarity between Robert and ordinary Bessemer steel.

\* \* The ease with which castings are poured indicates a dissimilarity that merely a horter metal could hardly explain, for ordinary soft Bessemer steel, though hot, is most prone to boil. The Clapp-Griffiths process presents somewhat similar conditions to those found in the Robert, and if we can believe any of the claims made for the peculiar properties in the former steel we have have still further grounds for faith in the latter. I mention this, for where there has been so much smoke there ought to be, at least, a little fire. The extreme fluidity of the metal under the existing conditions can only be accounted for by extreme heat, and I can only explain its production by the assumption that the blast entering at the top just below the surface and traversing a comparatively thin layer of metal presents a better opportunity for a more complete oxidation of the gases, and hence greater production of heat, than is the case with bottom blowing.

As regards the much-talked-of blowing down to a definite carbon countents simply through the agency of the blast, I saw nothing t

probable claim.

In conclusion, recognizing that a more extended investigation than I had time to make would be necessary for a fully comprehensive and final opinion, I believe, shearing the process of all nonsensical claims, that the acid steel has sufficient merit to recommend it for the manufacture of castings. I fail to see, however, how the basic can compete with the larger Bessemer converters in the manufacture of steel for rolling. Whether or not like results would attend the use of larger Robert vessels in either the acid or basic practice is an open question, and one that, as far as I am aware, has not been settled by actual trial.

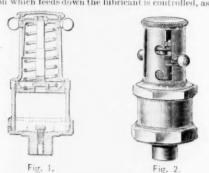
#### Driver Brake, London, Brighton & South Coast Railway.

One of the interesting details of locomotives shown at the Paris Exposition was a driver brake used on the loco-motives of the London, Brighton & South Coast. The drawings herewith show this brake in position on a four-

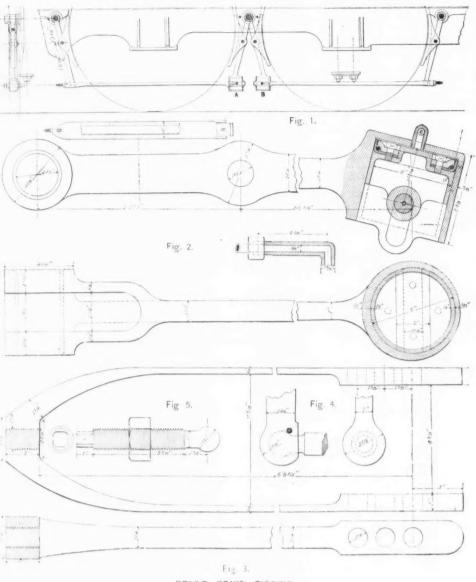
drawings herewith show this brake in position on a four-wheel locomotive. Its simplicity and its reliability in operation have recommended it for use on English railroads. The Midland Company is using a large number of them. Its construction is as follows: In fig. 1 can be seen two small air cylinders A and B, formed in an extension of the brake hanger, as shown in detail in fig. 2. In these cylinders move short pistons packed with leather, held with a cast-iron follower by a tap bolt, as shown in fig. 2. This piston has an eye formed therein through which passes a pin which connects to the brake rods on each side of the driving wheel. The piston is driven out by the admission of air to the back of the cylinder, as shown at C, fig. 2. From the pins D extend the brake rods, which are welded together at the opposite end, as shown which are welded together at the opposite end, as shown in fig. 3, to the brake lever on the opposite side of the wheel, where a joint is made between it and the brake rods by means of a set screw with a ball and socket joint, as shown in fig. 1, in a manner which is simple and requires but little space. A detail of the set screw is shown in fig. 5. The set screw is used to take up the slack in the brake caused by the wearing of the shoes and tires. The slight motion of the brake cylinder is slack in the brake caused by the wearing of the snoes and tires. The slight motion of the brake cylinder is not sufficient to necessitate the use of a rubber hose between it and the air pipe. The connection is made with a small piece of three-eighth-inch copper pipe. The brake cylinder and hanger are made either of cast steel or of wrought iron. as the facilities for manufacture warrant; but in all cases they are in made one piece, as shown, and are generally placed between the wheels, as indicated in fig. 1. as indicated in fig. 1.

### The Lackawanna Grease Cup.

We show herewith a grease cup designed for the use of heavy lubricants for guides, eccentries, etc. The piston which feeds down the lubricant is controlled, as in



other cups of this kind, by a spring, but the especial con venience of this design is in the method of putting ten-sion on the spring. Instead of a tension screw being used the spring is pressed down and fastened in position

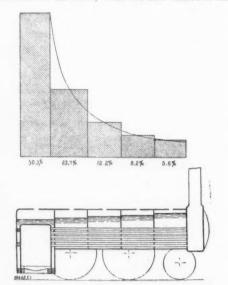


DRIVER BRAKE RIGGING. LONDON, BRIGHTON & SOUTH COAST RAILWAY.

instantly. The regulating plug is in the shank and is set to the desired position by a screw driver. This grease cup is made by the Lackawanna Lubricator Co., of Scranton, Pa.

### Evaporation in Different Parts of a Locomotive.

Engineering gives the diagram reproduced here, showing the comparative evaporation of the different parts of the heating surface of a locomotive boiler. It will be noticed that the evaporation in the fire box is considered to be about ten times as great as that of the last section of the tubes, while the first section of the



by the knobs shown in fig. 1, which, it will be seen, give three different degrees of tension.

The piston projects up through the spring case, show-

ing the amount of grease left in the cup. This tension arrangement is much more convenient than the use of a screw, as the spring can be put in compression or relieved portions give the comparative areas of those portions.

### English Accidents.

The half-yearly report of the British Board of Trade, giving a summary of the railroad accidents to July 1, 1889, includes special reports on 12 train accidents which were inquired into during the last half of the period covered by the report. None of these accidents were very serious. A feature of these reports is a classification of the casualties to employés according to the class of service in which they are employed. Thirty-five classes are represented, including contractors' employés, and the injuries are subdivided into 18 kinds, from amputation of principal members down to unspecified injuries described as "severe," "shaken" and "slight." The injuries summarized in this table include those happening to all employés, whether connected with train accidents or otherwise. Eighty-one passengers and no employés were killed, and 523 passengers and 59 employés were injured by train accidents in the United Kingdom during the six months. Of the passengers, 80 killed and 260 in-jured were on the Great Northern of Ireland, on which road occurred the Armagh collision, but the special report on that catastrophe is apparently not yet completed, as it does not appear in the book.

as it does not appear in the book.

We condense the special reports as follows:
On the Glasgow & Southwestern, June 20, at Johnstone Junction, a passenger train struck the caboose of a freight train which was just pulling onto a branch. The passenger was moving in one direction and the freight in the opposite, and the whole freight train had cleared the main line except the caboose. The signalman in the cabin at the junction gave a clear signal to the passenger train as soon as he found himself able to move the locking bar of the switch, instead of making sure by observation that the freight had cleared the main line. locking bar of the switch, instead of making sure by observation that the freight had cleared the main line. The freight would have cleared but for the breaking of a coupling between the 26th and 27th cars. A bystander saw the situation and motioned the passenger runner, and there would have been time to stop, but the runner did not catch the man's meaning quite quickly enough. The coupling (three-link) gave way at one of the bends of the middle link, and the car belonged to a private owner. The link was poorly welded, and General Hutchinson thinks careful examination would have de tected the unfit condition of the coupling. The scer the collision was at a point where the view from the signal cabin was very poor, and the inspector recommend

an interlocked clearance bar at the fouling point.

On the Great Western, at Devonport Junction, April 6, the engine of a passenger train was derailed in crossing the frogs at a junction where some of the tracks were laid with three rails, two gauges being used. Colonel Rich investigated the case, and decided that the guard rail, which had been in use 13 years, was not sufficiently strong, and its distance from the main rail was a little greater than is common in present practice. The guard rail simply sprung out of position and returned as soon as the engine passed, so that the weakness was not detected by the persons in charge. The flanges of the right side driving wheel and leading wheel were thinner than those of the left-hand wheels, showing that the engine bore to the right. Six of the 12 plates of the driving spring were found broken, but the fractures were so covered with oil and dirt that it was impossible to tell whether they were new or old; the inspector says, however, that the ground traversed by the wheel after it left the track

was not sufficiently rough to cause the breakage.

On the Great Western, at St. Dennis Junction, May 13, the two leading wheels of the engine of a passenger train the two leading wheels of the engine of a passenger train went off the track just after starting from a station. The engine was found in good order, and the cause is given as "a stiff engine starting on a new and very strong permanent way, of which the rail at the place the engine mounted is reported to have been very rusty." The curve was about 720 ft. radius at the point of derailment but in other rules; it was much charges and ment, but in other places it was much sharper, and there was a check (guard) rail for some distance. There was a junction near by, so that the outer rail could not

was a junction hear by, so that the outer rail could not be elevated. Therefore, says the inspector, the check rail might well have been longer.

On the Great Western, at Barton, June 6, a pair of tender wheels were derailed while the engine was backing a passenger car on to a side track. The cause was simply a misplaced switch. The yardmaster in hurrying, to save time, did some of the switchman's work and rulled the time, did some of the switchman's work and pulled the wrong lever. The inspector refers to the fact that this station was not properly a stopping place for passenger trains, and that if it is to be so used, a number of improvements, including interlocking, which is now lack ing, should be at once made.

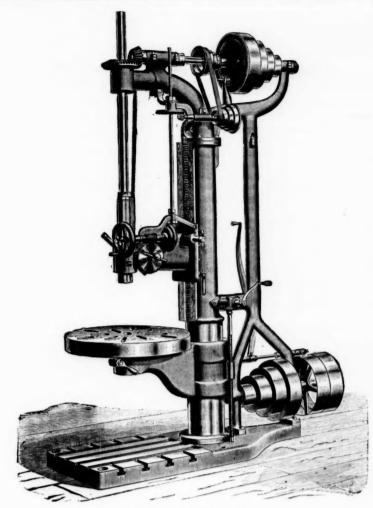
On the Great Western, near Witham, May 8, several cars of a passenger train were detailed and ran about 800 ft. on the ground, but no one was hurt. The road is narrow gauge, and the track consists of a bridge rail on longitudinal sleepers. The grade is descending about 110 ft. to the mile. The train was running at about 25 miles an hour, and the cause of the derailment was obscure. Colonel Rich thinks the longitudinal sleepers were not properly tamped, but also says that if the engine had been tightly coupled to the train the derailment would not have occurred. Fay's brake was in use and did good not have occurred. Fay's brake was in use and did good service, but a good automatic continuous brake would probably have prevented all damage. The sectionmen had been repairing the track. They did not order the train to slacken speed, and this, says the inspector, was wrong, for it is difficult to know whether the sleepers are thoroughly tamped until an engine has passed over the

aces. The man who used a wrong coupling is blamed. On the Great Western, at Fernhill Heath, June 21, the hind wheels of the hind car of a passenger train took the wrong side of a split switch and the car was made to straddle two tracks. The accident occurred at a little used switch on a side track where the train had backed in to take on some "horse boxes" (cars), and the switch was not in very good order. Colonel Rich criticises the custom of running passenger trains onto freight sidings in this way. It appears that it is customary on English roads to require the switchman to hold facing-point switches in position, while trains are passing over them, by pulling on the lever, and the inspector blames the stationman for not properly holding the switch-lever in

On the Highland Railway, at Keith, June 17, a mixed train just starting from the station ran over a misplaced switch at a crossover and into some empty cars on a branch line. Here again the rule requiring the facing point to be held while the train passed was disregarded.

If a man had been at the switch he would have noticed that one switch was wrong. The engineer, however, was not keeping a proper lookout, as he might have seen that the switch rails were in the wrong position in time to stop. Major Marindin says that it is worse than use-less to issue rules and then allow them to be habitually disregarded; but the evidence in this case shows that the switchman has other duties to perform which somethe switchman has other duties to perform which some-times prevent him from holding the facing point as re-quired, and the number of men at the station should therefore be increased. But the inspector places the chief responsibility for this accident upon the officer who laid this crossover track, and put it in use without submitting his plans to the Board of Trade for inspec-tion according to law. No inspection officer goods have tion according to law. No inspecting officer could have approved the changes made at this station, and the company is liable to a heavy penalty for its omission to report. The inspector observed that the train, as made up, had at the rear a vehicle on which there was no

On the London & Northwestern, at Wigan, June 15, a passenger train in front of a station was moved forward a short distance for some purpose. The engineer



UPRIGHT POWER DRILL

Made by the W.IF. & JOHN BARNES Co., Rockford, Ill.

of a switch engine standing a short distance behind it thought that the train was going away, and so followed it, but he followed too closely and bumped the rear car, when the train stopped. Colonel Rich simply says that the engineer "had been on duty half an hour, and he benefit the same after he had found the ordinary means of stopping inadequate."

Upright Power Drill. should not have followed the passenger train closely.

On the same road, June 29, at New street, Birmingham, a Midland train ran into a train of empty passenger cars standing at one of the platforms. The engineer was experinced and had run here some time, but he

was experinced and had run here some time, but he had never before found a train standing at that platform. The rules, however, required him to always approach this station under control, and Colonel Rich says he did not keep proper lookout.

On the same road, June 8, at Staines, a passenger train which had stopped at the outer limits of the yard (after starting from the station) was backed into at the rear by a long freight train which was being pushed through a crossover track under an impression that the bassenger train had gone. It was on a curve, and the passenger train had gone. It was on a curve, and the engineer of the freight had to depend wholly upon the signals of the trainmen. The collision was very slight, and the testimony was conflicting about the hand signals given to stop the freight. Major Marindin says that a freight should not be thus backed until the track is clear to the extreme limits of the yard, and that the position of one of the switching signals should be changed. It is now so fixed that the roof of a building interferes with a good view of it.

On the North London Railway, at Broad street, June 26, a passenger train coming into the station ran into the buffer stops. The engineer miscalculated the distance, and Major Marindin simply says that "he is a very old servant of good character, and had been on duty about three-quarters of an hour." The runner had worked for the road 40 years, and had been a runner 30. nals of the trainmen. The collision was very slight, and

the road 40 years, and had been a runner 30.

On the Southeastern, at Grove Park, June 24, a pas senger train came into the station too rapidly, and ran into a vehicle standing at the end of a "bay line" (spur track), injuring five passengers. This engineer had been in service 34 years, and had been an engineer 23. "His in service 34 years, and had been an engineer 23. "His mistake arose from some rain having suddenly fallen while his train was between the distant and the home signal, which rain, combined with some loose dried grass lying upon the rails, made them very slippery," and General Hutchinson is "glad to be able to form the opinion that there was nothing reekless" in the runner's conduct. There was no power brake. Four of the cars had brake appliances, and the other two had brake pipes, but this engine and 19 others were still unsupplied with power brake appliances. General Hutchinson does not seem to regard a continuous brake as the proper thing for everyday use, as he alludes to "a reserve of brake

The accompanying figure illustrates an upright drill made by the W. F. & John Barnes Co., Rockford, Ill. It has a number of appliances, designed to render the use more convenient, the leading idea being to attach per-manently levers, handles or wrenches for making all ad-justments, such as shifting the driving belt from tight to loose pulley, starting or stopping the automatic feed, raising, lowering, securing or swinging the platen to one side, feeding by hand, and connecting or disconnecting the back gearing. The automatic feed is driven by small cone pulleys, as shown, and can be instantly stopped or started by moving a small lever. The usual wheel for hand feed is provided. The back gearing, of the planetary type, is placed within the upper driving cone, and is stopped or started by moving a lever situated on the face of the cone. The belt shifting lever and crank for raising or lowering the platen are plainly shown in the engraving. The drill head and spindle are counterbalanced. These drills are made in two sizes: No. 2½, with 28 in. swing, and No. 3, with 34 in. swing.

### An Exciting Runaway.

An Exciting Runaway.

On Thursday morning, Nov. 8, an eastbound freight of 38 cars on the Pennsylvania Railroad broke in two just after leaving Gallitzin, at the top of the grade west of Altoona. Eight cars were left in the tunnel, and the conductor and one brakeman were on the foremost portion. There had been a heavy rain, and the rails were slippery, so that the conductor and his one brakeman found themselves unable to control the speed. The block telegraph operator at Allegrippus saw that the train; was running too rapidly, and telegraphed to Altoona, where a track was cleared for the reception of the train. But ahead of this train were a train of heavy refrigerator cars and a work train, and out, and it is said even higher, and overtook the work train at Scotch Knob. Here the caboose and one tool car were knocked off the track, but the work train, whose engineer put on steam, ran ahead a considerable distance, but was again struck by the freight, this time at McGarveys. Another car at the rear of the work train was here knocked off, but the train still kept on and ran another mile, when the third collision occurred, wrecking two more of the work train's cars and derailing a car of the freight. This last collision brought both trains to a standstill, but the freight engine was not derailed and not much injured. A man in the work train caboose was killed in the first collision. The fireman of the freight jumped off after the second, but the engineer went back and helped to put on brakes. The conductor, engineer and fireman of the freight were all injured, the other cars and the engineer of the work train was especially critical, as he momentarily expected to overtake the train of refrigerators, but the latter reached Altoona in safety.



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#### EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially us in making our news accurate and comple they will send us early information of events which take place under their observation, such as changes in rail-road officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experi-ments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Dis-cussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, except in the advertising col-We give in our editorial columns OUR OWN opin UMNS. ions, and those only, and in our news columns present only such matter as we consider interesting, and im-portant to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising col-umns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertis-

In another column is described a starting apparatus for compound locomotives which has several new and interesting features. It is probably the simplest device yet made for the admission of high-pressure steam into the low-pressure cylinders. While such simplicity may not be necessary, yet that feature is always commendable. The experience with automatic admission apparatus has not been as a whole satisfactory. The parts are numerous and liable to get out of order On English and Continental roads, where more time is allowed to care for engines, and nearly all engineers are good machinists, devices can be used successfully which would not be acceptable in railroad service here. Compound locomotives of the simplest form are not more complicated than the ordinary locomotive but if automatic admission valves are used and an increased number of cylinders, together with a duplica-tion of valve gear, then such locomotives will have more parts, be more difficult to repair, and be not so easily comprehended by locomotive runners, and further, in some instances, greatly increase the work lost in the friction of parts. Therefore, every device such as the one illustrated, which reduces the number of essential parts and simplifies the construction of the compound locomotive, is of especial interest to those who are contemplating the use of the double expansion systen.

The Master Car-Builders' Association committee on the best material for brake shoes is about to take up, with the same vigor that characterized the work of last year's committee on brake gear, the work of investigating the relative values of the different materials and methods of using them. Mr. Godfrey W. Rhodes, chairman of the committee, has called a meeting to be held, if the other members can arrange to be present, at the Grand Pacific Hotel, Chicago, on Dec. 16, at 10 a. m. Representatives of the various brake-shoe makers will be asked to attend this meeting and will be requested to present their views on the best method of testing brake shoes and to make suggestions regarding the selection of the most suitable brake-shoe ma-It is the intention of the committee to consider the values of different materials for brake shoes under three heads. First, retarding power with regard to (a) the maximum co-efficient of friction. (b) minimum, and (c) uniformity of the co-efficient of friction. The maximum retarding power will be determined under the various conditions of speed and pressure, and the minimum likewise. From these determinations the From these determinations the uniformity of the retarding power with variations of speed will be studied. It is necessary to know if the brake power is greater with one material than another brake power is greater with one material than another which ships it for him, but to some line further east, when the speed of the train is reduced, because that which ships it for him, but to some line further east, and this car-owner, of course, wishes the corn to go immediately into his cars. If it goes into the store-for a transfer of voting power in several corporations

However, it will not be expected to find any material which will give absolutely a greater co-efficient of fric-tion at high speed than at low; but a material may be found which will give more uniform braking power than other materials at high and low speeds. The wearing quality will be determined under the conditions of service as nearly as possible, and the wear of the tread of the wheel will be considered as well as the wear of the shoe. The cost of brake shoes will be considered because it is not to be expected that that material which call be considered. pected that that material which will be the best in its retarding power and wearing qualities the cheapest to use. In making their report the committee will probably state the relative retarding power, wearing qualities and costs of the various materials; and from a consideration of these three points they will draw their conclusions. The tests will be made on steel tires as well as on chilled treads; and after the laboratory tests have indicated the comparative values of the different materials, actual tests will be made in service to show the retarding power of the shoes as well as their wearing qualities. This early movement on the part of the committee is gratifying. and it is to be hoped that the cue will be taken up by the other committees and work commenced in sufficient time to enable the reports to be completed without haste at the last moment before the next meeting of the con-

### The Car Service Problem.

Mr. W. G. Wattson, known to most of our readers as prominent member of the Car Service Association, an xpert on the subjects discussed in that association, and worker in the same line on the Time Convention committee as well, gives us in this issue a very full "symposjum" on the present condition of the freight car service of the country. Every one knows that condition to be bad. He gives the views of a number of the best judges, and while the general tenor of these opinions is way, they are worth reading on account of the special expressions concerning various details, which are often brought out more effectively by one man than by another.

Mr. Prevost touches upon the syndicate idea, giving a hint of what might be accomplished by pooling the ownership of cars. We have constantly before us an ownership of cars. xample of this on a small scale in the management of the Pullman Company, whose cars are often drawn from a wide extent of territory for the purpose of a commodating a special demand at one point. The adaptation of such a system to freight car service. which would be simply an expansion of the system already in use on well-managed individual roads, would be a tremendous problem, but is worth thinking about, Mr. Maroney and others bring out the fact that if all our cars were loaded and ready to move (as they ought to to be) we should not have engines enough to haul them; and the existence of much new railroad in th West and South which has been built without providing a corresponding supply of equipment is another fact in this same line. But we need not worry much over this, for the money now spent in renewal of freight cars can readily be turned to providing new locomotives as fast as the use of cars for storehou abolished. The inadequacy of terminal referred to must mean buildings, chiefly; as far as yard room is concerned, it turned out to a superabundance on the New York & New Eng-As soon as cars were moved with reasonable promptness there was found to be a surplus of track space. The presence of 10,000 loaded cars uncalled for in a single city ought to be a startling fact. though there are so many cities in nearly the same condition that we fear it is not. Mr. Horton states a significant fact, but only the truth, when he says that an unlimited supply of cars would not cure the evil. This is true at all points, but is especially true in the grain-shipping territory of the West. The railroads have extended their tracks and the farmers have increased their acreage, but the only means of getting the increased supply of grain to St. Louis, Chica further east is by carting it to the nearest railroad station and shoveling it directly into the car. houses at shipping points have not been built.

The remedy for this one phase of the difficult; to go beyond it, is exceedingly difficult of application. If a farmer presents his grain for shipment, how can the railroad refuse him, if it has the cars? Mr. Blakes lee wants the traffic department to stop shipping grain "to order." It may be said in answer that, in the first place, the traffic men cannot do this if they would, and that in many cases they do not wish to. The cars for a Nebraska farmer's corn may belong, not to the road

greatest comparative braking power at high speeds. house it may finally go forward in some other company's cars. Moreover an Eastern road may be building cars by the hundred all the time for this very purpose. Sending cars out West to wait for traffic is an expensive way to get business, but the traffic departments are used to expensive methods. But if the railroads agree among themselves that storehouse must be built, they cannot find the man to build them and they must put them up themselves. Wherever demurrage has been effectually carried out it has tended to compel the erection of additional storehouses. In some cases this tendency has been marked.

But the general question is beset with difficulties even if we draw a line this side of the grain districts which are unsupplied with adequate warehouses. When a trunk line has 3,000 cars waiting a month at a time at New York for European vessels, and the coal roads at Cleveland have a similar number waiting for coal vessels on the lakes, the heavy burden of expense of these idle wheels must be borne by some one. Under the present plan it is borne by the car owner. der a demurrage system, with the present mileage rate for interchange, it would be borne by the con-Under a demurrage system, with a per diem rate for interchange, it would still be borne by the consignee, but the recompense would be more justly divided between the car owner and the yard owner and switcher. But the sudden imposition of so great an expense upon the consignee is impracticable. The roads have allowed the present vicious system to grow up, and so, if they would introduce a more equitable plan, they must arrange to temporarily assume at least a portion of this burden themselves. The road holding the cars, being unable to collect its just from the consignee, must appeal to the other roads interested in the traffic for help. With a per diem system this becomes the immediate point at issue. Whether any general plan can be devised for meeting such complications at all points, or whether each case must be made the subject of special negotiations between the roads directly interested, is a question.

All this on the assumption that the road desires to get pay for the use of its cars. But when business is dull the weaker roads are only too glad to give away this service, if by so doing they can attract or retain customers. Shipping corn, potatoes, lumber and other things to order before any real buyer has been found can be stopped by collecting pay for detention; but at competitive points this is feasible only when busiis active; and the rushing of freight in the fall, consequent largely upon the lack of storemakes business comparatively dull eight nonths in the year. Can the screws be tightened sufficiently in four montas to prolong the effect of the pressure through the year, or until some one builds a few hundred storehouses? To exert any pressure on a shipper when you are in constant fear that he will leave you is contrary to the nature of a freight solicitor.

We thus come back to a question that was prominent in the first lively discussion about demurrage. to wit : can the transportation department turn its back on the traffic department and enforce just and equitable methods in spite of loss of business? Strong roads have carried out action on this line, but only by the exercise of much "grit," Pos i Is the roads of the country can afford to waste hundreds of thousands on freight cars for the sake of getting business, the same as they have wasted hundreds of thousands on ticket commissions for the same purpose; but the intelligent manager should at least take the satisfaction of doing it with its eyes fully open.

### Obstacles to the Formation of Trusts.

Four months ago we published an editorial on the nestion whether a railroad trust could be successful. We did not think it could, and we hold the same opinon still more strongly to-day.

It is harder for any trust to maintain itself now than it was a few months ago. The end may be just as important as ever; but the means are more difficult se without coming in conflict with the courts. A trust. it must be constantly remembered, is simply a meanto an end. The end sought is permanent harmony of management. If this could be secured by contract. the matter would be comparatively simple; but such contracts never were thoroughly effective, and the law against pools has destroyed what little power they had. If harmony can be secured by consolidation the end is obtained once for all. But such consolidations are not easy to arrange. They may be endangered by the opposition of certain investors; they may be wholly

defeated by legislative hostility.

It was the hope of those who first devised the sy

into the hands of the same body of trustees. They total amount evaporated. When the tubes experi- Rule 31), and a road desiring to use fusees can easily hoped that this would be as easy to arrange as a set of ontracts and as permanent as a consolidation. In the latter respect they have been in many cases disappointed. Trusts were effective as long as the courts did not become alive to their true nature. When once the judges make up their minds to check them, it easy enough for them to do so. In some respect trusts are more open to judicial overthrow than pools were. special legislation, the utmost that In the absence of the courts could do against pools was to declare the contracts void. But in the case of trusts, they can attack definite persons. If a contract is against public policy, it is no contract; and that is usually the end of it. But if a set of men are acting and have permanently arranged to act against public policy, that is not the end of it. It is but a short step from the proof of such arrangements to the charge of conspiracy.

An incorporated company organized for the same purposes is somewhat better off than a board of trustees, but not very much so. As things are going today, the courts would probably make life miserable for it. A concern like the People's Transportation Company, of which the newspapers have had so much to say during the last few days, could hardly accomplish the objects for which it is designed. In the first place it would be hard for it to get a controlling interest in all the individual railroads whose adhesion would be necessary to the success of the scheme. Next, its tenure would, at the very best, be somewhat inse-A company formed with the avowed purpose of controlling rival railroad lines would meet with constant hostility from public authorities. The courts would be only too glad to take the part of a minority of stockholders to relieve the public of the effects of majority rule of this kind.

Nor would it be easy to adjust the management of such a combination to the demands of good railroad economy. This part of the project, as it was outlined in the newspapers, is open to severe criticism. A jointpurse arrangement which allows each road its full amount of operating expenses is simply a premium on extravagance. It takes away from the subordinate officials all motive of special economy; while the heads of the enterprise itself would be so far relieved from the stimulus of competition that they would not try to secure traffic by reductions in rates. All motive for progress would thus be removed, and our roads would sink into as unenterprising a condition as those of France with their legalized monopoly and guaranteed dividends.

Whatever may be the outcome of the present crisis it will not be allowed to end like this. Any solution, to be at all permanent, must meet the needs of good railroad economy. If the problem cannot be treated as a purely financial one, it is, to an even greater degree. a difficult administrative one. If any arrangement gives more orderly administration, with better service and better economy, the public in the long run is likely to acquiesce in it. But if it is a purely mercantile arrangement, designed to raise profits rather than to meet practical difficulties, it is almost certain to prove a failure. Such was the fault of the Inter-state Commerce Railway Association from the outset: such seems to be, in even greater degree, the fault of most of the projects designed to secure similar ends.

### The Length of Boiler Tubes.

The Paris, Lyons & Mediterranean Railroad of France has been making some experiments on the comparative value of short and long tubes in the lo-comotive boiler. These experiments were made in order to determine the most satisfactory length to use with compound locomotives. Some of the conclusions are interesting. With an equal amount of total work performed, it was found that the quantity of water vaporized per pound of coal was always decreased when the length of the tubes decreased, but that the diminution in efficiency was small when the length was decreased from 23 to 19½ ft., and even to 16½ feet, the decrease in economy was very slight. From 16½ to 14½ ft. the reduction in economy is much greater, and from 14½ to 13 ft. it is considerable. After this point is reached a further reduction below 13 ft. in length reduces the economy regularly: that is, almost in proportion to the reduction of total heat ing surface.

was further found that if it was desirable to consider, instead of the amount of water vaporized per lb. of coal, the total amount vaporized in a boiler in a given time, the change in tube lengths produced a different result. When the length of the tube was decreased below 23 ft. the total quantity vaporized in a given time was considerably increased, and kept increasing until it was at a maximum between 144 and 13

mented with were about 9.8 ft. in length the total evaporation in a given time was reduced to be equal to that when they were 16½ ft. in length. As a result of these experiments the road has adopted standards for lengths of tubes varying from 13 to 14# ft., the average approaching nearer to 144 ft. With boilers having tubes of these lengths there is found a total evapora-tion in a given time about five per cent. greater than with boilers having tubes 161 ft. in length, but to the contrary there is a loss in the water evaporated per lb. of coal varying from 2½ to 5 per cent.

Why it is that the rate of evaporation increase when the tubes are shortened is not clear. It may be that a constant draught, or rather a constant gas ve-locity through the tubes, was not maintained during the various tests; that is, that the gases did not move with the same velocity through the longer tubes owing to the increased friction. From this point of view it is easy to see that a given back pressure in the cylinders—using the same exhaust apparatus will draw less gas in a given time through tubes of 22 ft. than through tubes of 14 ft., and therefore a smaller amount of coal would be burned on the grate and less water evaporated unless it should happen that the increased efficiency of the long tubes overbalanced the increased rate of evaporation due to the large amount of fuel burned in the case of the short tube The point where the gain in efficiency offsets the increased rapidity of combustion seems to be from these tests where the tubes are from 18 to  $14\frac{\pi}{4}$  ft. in length. Below those lengths the loss of efficiency is so great that it offsets the increased rapidity of evaporation resulting from the greater amount of fuel burned per unit of time, and therefore the total amount of water evaporated in a given time is less than when the tubes are of such lengths. Above those lengths, i.e., 13 to 14% ft., the reduction in fuel burned seems to so much reduce the total evaporation that the increased efficiency will not offset it, and, as a result, the boiler has, while being more efficient, less capacity for a given force of draught. This seems to be the most rational explanation of the causes that bring about the results in these experiments.

The experiments above noted seem to have been carefully conducted so far as can be learned from the officers of the Paris, Lyons & Mediterranean, and if they indicate the results in American practice then they are exceptionally valuable at this time, when there is a desire for economy and a disposition to use longer or shorter or different sizes of tubes, if necessary to increase the efficiency of locomotive boilers. The conclusions drawn by the Paris, Lyons & Mediterranean are substantially that the purposes of that road will be best served by a locomotive boiler which has the greatest rapidity of steam generation, rather than by one which gives the maximum economy, provided that the sacrifice of economy in order to gain a higher rate of evaporation is not too great. This seems like good judgment, and particularly in the case of French locomotives, where the total weight permissible limits to a great extent the dimensions of the boiler. It is interesting to read and useful to know-if it be true-that long-tube boilers, where the tubes exceed 15 ft. in length, will not generate so much steam in a given time, but will, nevertheless, be more economical in operation than boilers with tubes less than 15 ft. in This is just the sort of information that the railroad man wants, and it is to be regretted that we have not some results from our own locomotives like the foregoing, not only with reference to the lengths but also with regard to diameters, with which to make comparisons. If locomotive boilers are not only much less efficient from an economical standpoint, but also have less capacity when the tubes are of lengths under 13 ft., it is desirable to know it and the cause of it. It is not an easy matter to lengthen locomotive boilers, therefore it will be advantageous to know just what other changes in design will offset a loss due to a use

### Use of the Fusee Signal.

The value of the fusee as a danger signal and the insufficiency of the rule in the standard code concerning it are the subject of a communication printed in another column. The fact that the uniform code had to be agreed to by a large number of independent, strongminded men seems to very often escape the attention of those who criticise its provisions. The brevity of Rule 31 is to be accounted for by the fact that comparatively few of the roads in the Time Convention and of the men in the committee use fusees. The committee simply recognized the value of this means of protection without committing the Convention in its favor and without requiring its adoption. A road which makes no use of it can adopt the standard code without mak-

insert a supplementary rule between 31 and 32 or after Rule 99. The reason that an individual manager escapes the difficulties encountered in the committee lies in the fact that he has only himself to please. There were points on which five of the committee held one view and which the other four looked at in exactly the opposite way, and yet the subject was not necessarily omitted from the code. It is important to remember this, because it is an essential element in all efforts toward uniformity, and explains most of the omissions from the standard code.

We fear that the rule suggested by our correspondent would meet with numerous objections. In fact. if one were to follow the view of some of the most in-fluential members of the Time Convention, he could tear it all to pieces in a few minutes. It is doubtless now agreed by a majority of superintendents that the rule covering the protection of trains from rear collisions should be operative at all times, and the provision that a fusee is to be used by the brakeman whenever he is being followed by another train runs against this snag at the outset. The question at once arises, how is he to know when he is being followed by another train? The proposed rule applies only at night or in foggy weather, and yet on crooked and hilly roads it is needed almost as badly in clear Managers are agreed that the rear proweather. tection rule should apply at all places (outside of sta-tions) as well as at all times. A consideration of these objections indicates the grounds on which hundreds of superintendents would object to the use of

But the main strength of the objections lies in th fact that the proposed rule gives brakemen wide discretion. While a large share of the best brakemen are competent to exercise this discretion, and the rule would probably often be of value in the hands of such men, it is still deemed necessary to provide regulations which shall take into account the lazy, sleepy, inexperienced, or dull-minded brakeman, of whom most roads have a few and some have a good many.

It seems to us that if a fusee is to be used it should be thrown off at intervals of distance and not of time. A train encountering the first fusee would, of course stop and wait until the 10 minutes had expired, but if the preceding train should run three miles at 35 miles an hour, which would take less than 10 minutes (only about five), it might then lose enough time to fall back dangerously near the other train, while the latter would be coming on without any warning of an obstruction ahead.

But the final difficulty, and the one which overshadows all others, is the question about the quantity of signals to be used, and con equently the cost, and the difficulty encountered by a brakeman in deciding when he shall use the signal. An engineer followed by another train may find himself losing time half a dozen times in the course of a trip. He cannot afford to slacken his pace and let off the brakeman, because to do so would often result in stalling the train unnecessarily. On a long up grade, or on a crooked road, or in a snowstorm which impeded his progress the occasions on which he might deem it prudent to drop off the brakeman would be very frequent, and the opposite consideration, that prudence required him to keep all his brakemen with him, would produce a constant conflict.

So far as we can learn, the use of torpedoes is mostly on roads of thin traffic, located in level country, most of them being in the South. Where there are numerous long tangents and where traffic is free from fluctua-tions, so that the force of trainmen does not have to be frequently recruited from inexperienced men, there is considerable temptation to relax the strict requirements of the standard code, and some reason in doing so. The flagging and torpedo rule, to say nothing of the use of fusees, is very difficult to enforce where brakemen can see back two or three miles, and where they are, moreover, perfectly sure that no train is following within two hours of them. It is true that a fusee would have been just the thing, under the New York Central's practice, to prevent the Palatine Bridge collision: but it would not have been right for the foremost train to run along four miles at a greatly reduced rate even then. A conductor, carrying hundreds of passengers, who knows that his train is closely followed by another fast and heavy one, should not depend upon the best fusee in the world, nor apen that with flag best fusee in the world, nor apen that and torpedoes added. He should put a man in charge of these signals. This much is true, whatever we may say about the construction of rules and the necessity of sometimes trusting to torpedoes alone. We mentioned fusees in our comments on the collision in our issue of Nov. 1, but it must be apparent to those who have read what we said on the subject that we deem a ft.; but after that a further reduction decreased the ing any alteration (except perhaps the omission of more radical remedy necessary; for that reason we gave little space to the views our correspondent expresses to-day. The block system is the true remedy on roads of any considerable traffic.

# Overworked Station Men and Troublesome Pas-sengers.

We print the above because it seems to be a pretty good pecimen statement of a class of complaints, which in the aggregate number thousands, and which constitute the ground for an appreciable share of the unpleas antly critical feeling, expressed or unexpressed, which some of the public constantly have toward the railroads. Bearing in mind that the public is largely inclined to treat the railroads of the country as one body. or at least as having much the same habits and manners, a question of this kind is not beneath the attention of any superintendent. The gentleman in this case may have lacked tact, and the politeness referred to may not have been excessive; but experienced railroad men do not need to be told that a valuable part of the training of their subordinates concerns the proper method of dealing with just such customers as

It is a proper rule to require baggage to be brought five minutes before the departure of the train, but many roads do not publish this rule, and those which do publish it make very little systematic effort to enforce it, or to show the public that it will be enforced when necessary. It is inevitable that a baggageman shall have heavy work at train time, and for this reason his position is really an impor-tant one, for a man who can do a whole day's work in a dozen periods of 15 minutes each cannot be hired for the price which will secure the capacity to do the same work in 12 hours. At small stations this be comes a difficult problem, for it is not practicable to employ a numerous force of helpers; and the most feasible remedy seems to be the constant and persistent in-struction of the station baggageman to keep the fiveminute rule before the attention of the public, reminding them of it constantly and politely, while he, at the same time, may be a little easy in enforcing it.

The strength of the complaint quoted above lies largely in the fact that the station referred to is in a city of 25,000 inhabitants. The station building is small and the baggage room not very convenient. trunk referred to was left at the wrong end of the station platform, when if a little well-timed advice had been given it would have gone to the right end. ticket seller who strictly enforces his 15-minute rule when a passenger has been left is badly lacking snavity. So many ticket offices are open nearly all the time during business hours that the enforcement of such a rule, even at small stations, is increasingly diffi-No doubt this man had plenty of work on hand to busy him until 10:27, but if such were the case he would better have retired at once to the cellar or garret and given assiduous attention to that work. long as passengers will make mistakes of various sorts, and will get left occasionally, either from their own fault or that of some one else, nothing but a very selfish policy will enable stationmen to avoid some of the burdens resulting from those mistakes, and the wise ticket seller will therefore often submit to inconvenience for the sake of keeping his patrons good-natured. This suggests the most rational remedy for all phases of the trouble here reterred to, which is the employ-ment of men, both for ticket sellers and for baggagemen, who have good judgment and good nature, and who have had long experience as assistants,

The New York Committee on Site and Buildings for the World's Fair of 1892 have at last definitely fixed upon a site—in their minds. But it is one thing to decide that they will occupy private land, tearing down residences, churches and hospitals, and another thing to obtain pos session. Nov. 7, the Governors of Bloomingdale Asylum agreed to permit the use of the asylum grounds if they were paid a fair rental, the cost of their buildings (valued at \$1,000,000) and the extra cost incurred in hastening the construction of their new buildings, but added that in any event they could not give possession until Mey, 1891. Nov. 8, at a meeting of the Committee on Site and Build ings, the site was fixed as follows: Riverside Park, Mor ningside Park and lands between them; lands north of Central Park, between 110th and 113th streets, and lands lying east of Central Park, between Fourth and Fifth avenues, and from 96th to 110th streets. This land, it is estimated, contains buildings which are worth, on a low valuation, \$5,000,000; but as the committee evidently expect the city of New York to assume all the expenses of the site, little items like this are, perhaps, unworthy of notice. Of course no one can say certainly that the city has the right to appropriate money for such a purpose, even though it should be willing to do so, of which there is no evidence. The committee also passed the following

solution:
"Resolved, That this committee is not averse to using in connection with the exposition the lands and buildings now occupied and reserved for the Metropolitan Museum of Art and the American Museum of Natural History if the trustees of these institutions obtain the legislation necessary to authorize their use for the pur pose of the exposition."

The site adopted contains about 283 acres, of which 196 are private property; and if the committee succeed in obtaining all this private property, whether the owners are willing or not, and, in ample time for their purposes, they will accomplish a miracle. The results of interviews with two prominent business men, recently interviews with two prominent business men, recently published, are not without interest. One said: "Yes: New York is going to get the Fair, but it will not be held in 1892. Perhaps it is too early to spring this fact on th public, but I wish the newspapers would unite in propos public, but I wish the newspapers would unite in proposing the postponement of the Fair until 1894. Columbus has waited 400 years for a celebration, and I think he can afford to wait two years more. I tell you there is not time to prepare for a fair to be held in 1892. It is physically impossible." The other interview is still less optimistic: "We may as well throw up our bands and acknowledge that we are beaten. New York may hold a World's Fair in 1992, but not in 1892." The manner in which subscriptions to the guarantee fund lag show, indeed, that enthusiasm is not at the fever heat. Here is the record to date: is the record to date:

Some individual efforts are worthy of note. The World, through its canvassers, has secured subscriptions amounting to \$163,968; and a list is published, showing that the employes of H. B. Claffin & Co. have subscribed

Chicago, not content with its efforts in the United States, has sent agents to England, offering to carry all exhibits from New York to Chicago free of charge, and to have a bill passed by Congress allowing these exhibited articles to be sold without payment of duty. Mr. Jeffrey, lately General Manager of the Illinois Central, has been some time in Paris, working, according to Mr. Whitelaw Reid, "not only with activity, but on a sys-tematic plan and with keen intelligence," for the Chicago people. If the Exhibition goes to Chicago, Mr. Jeffrey is to be the director-general.

The Baltimore & Ohio has revised its time-table form The Baltimore & Ohio has revised its time-table form. Hitherto, the main line working time-table has been made up in book form, with pages about  $5\times 9$  in., a page being devoted to each train, thus making the book about  $\mathcal{U}$ -in. thick. This gave a wide margin for notes against each station, and made the schedule of any one train very easy to understand; but it required the reprinting of the names of the stations throughout for each train, and therefore involved considerable unnecessary work. The new form is a regular old-fashioned sheet about  $22 \times 30$  in. The general train rules which heretofore have appeared in the back of the book are now placed on have appeared in the back of the book are now praced on the back side of the time-table, covering the whole of it with pretty small type. Apparently the same type has been used as before, though the width of the columns has been changed. It is to be regretted that so impor-tant a road has not seen fit to adopt the standard code. The rules bear internal evidence of the work of a careful hand. There are many paragraphs giving just the right kind of instruction on points which often receive but scant notice, and some of the best rules in the standard code have been inserted; but the fault of most individual codes that have had much work done upon them
—that of repeating rules, multiplying them ast libitum
and throwing them together in a confused jumble—is here seen at its worst. Admitting that every rule in this code is a useful and proper one, the fact remains that not one conductor or engineer in a dozen will have a clear and cogent notion of the rules as a whole. occasion last April to criticise the code of a promi. Western road, which had been compiled in some

carefully printed in large, clear type and bound in a book, so that it is presumably destined to last some time. The Baltimore & Ohio code has apparently not had very much new work done upon it, so that we are not sure but the management in management tends to make use of the standard code yet. We regret to feel obliged to criticise the make up of this work, because it is, in its substance, worthy of much praise, and there are a number of points which all superintendents would do well to look at. The time interval between trains, which has been five minutes for some and ten trains, which has been five minutes for some and ten minutes for others, has been made seven minutes for all trains at all times, except that in fog or severe storms each train, after leaving notice for the train following it, is to slacken so as to lengthen the interval to ten minutes. The local freight trains are given a margin of one hour for doing their work at stations; that is, they need not said our after while storming at station will be not send out a flag while stopping at stations until one hour after their time, unless a regular train is due. All freights and extras must be run under control in yard limits, but we cannot learn from the table how far this excellent rule applies; there is no information as to where yard limits are officially established, except the paragraph mentioning the "extreme switches" at each station, and this generally fails to be effective. Where the extreme switch is a long distance from the station runners do not sufficiently respect the limit, and where it is only a short distance away it does not afford room ugh to be of much benefit.

Various announcements are published concerning the improvements in passenger service which are to be made by the Chicago & Northwestern and the Union Pacific, in pursuance of their recent traffic agreement. The through day trains between St. Paul and Sioux City are to be extended to Council Bluffs. The time between the arrival of Northwestern trains and the departure of those of the Union Pacific, and vice versa, at Council Bluffs, is to be reduced. The fast mail which is handled by the Union Pacific will continue to go between Chicago and Omaha over the Burlington. Through passenger trains Omaha over the Burlington. Through pare announced between St. Paul and the of the Union Pacific, via Sioux City, and it is said that the time to Portland, Or., will be 82 hours, considerably less than the present time by the Northern Pacific, but the detailed statements indicate changes of cars as follows: Reclining chair cars between St. Paul and Columbus. Neb., Pullman sleeping cars between Sioux City, Portland and San Francisco, and second-class sleeping cars between Columbus, Portland and San Francisco. At Green River, Wy., transfer will be made from the San Francisco car to through cars for Portland, and at Sacramento transfer to through car to Los Angeles. fastest train from Chicago sleeping cars will go through from that city to San Francisco in 86 hours, and to Port-land in 82. This is about nine hours quicker to San Francisco than the fastest passenger service heretofore. The train leaving Chicago at 10.30 p. m. will continue to go through to San Francisco in 95 hours, and to Portland in 94, carrying through day cars and first and second-class sleeping cars. The other Chicago-Omaha lines will doubtless accelerate their schedules.

The severe and unprecedented snowstorm in Texas and New Mexico last week caused great inconvenience, de-lays and losses to the railroads. Dispatches report that the engineers found the track in many cuts obstructed by carcases of cattle and sheep which had been driven there by the storm, and had frozen to death. The Denver, Texas & Forth Worth had to carry provisions long dis tances by trains for its men working with snowplows. A Rotary snowplow was finally borrowed from the Colorado Midland, and on Nov. 9 a through train arrived at Denver from the South for the first time in eight days, but even then it had to use the Denver & Rio Grande track north of Pueblo. The situation along the line south of Trinidad was rapidly becoming desperate, as entire towns had run short of supplies, while ranches within a radius of 15 or 20 miles used up their stores completely. Stockmen never experienced such a blizzard on the Southern ranges. In the vicinity of Folsom, N. M., it is said on good authority that 50,000 sheep were on the way to the railroad for shipment to Nebraska and Kan feeders. The fall of snow has averaged over three feet on the level, while the force of the wind piled the snow into drifts 15 ft. high. Hardy range cattle were unable to face the terrible blast, and the loss is enormo

The Chicago, Burlington & Quincy Railroad has decided to place collarless axles under 80 refrigerator cars, using its standard freight truck without end frames. This will give the collarless axle a good, substantial trial, and if under the severe conditions of refrigerator car service the truck still remains square, the journals look as well, and the brasses wear as evenly as those which we have recently seen from locomotive tenders on the same road, there will be some foundation for a belief that such axles can be used under the ordin-ary truck without fear of distortion or of other bad results. In this connection there is one fact learned by some recent observations which may throw some light upon the probable results of the use of collarless axles under the conditions mentioned, and that is that axles having collars do not always bear on the inner collar on one side and the outer collar on the other side what the same manner as this. That one, however, was as they are supposed to. An examination of trucks in service shows that the collar on one side is often onequarter of an inch away from one brass when that on the other end is bearing hard against the other bra

In Engineering, Sept. 27, 1889, there appeared a note saying that the Mayor of Philadelphia had found it impossible to obtain an unpredjudiced analysis of the drink-ing water of that city by American chemists, and had therefore sent samples to a celebrated German chemist. The following letter from the Mayor of Philadelphia shows the facts to be quite to the contrary:

"His Honor Mayor Edwin H. Fitler directs me to acknowledge receipt of your communication of 28th ult., regarding the sending of Schuylkill water to Germany for analysis, and state in reply that he did not termany for analysis, and state in reply that he did not send the water to Germany or any other place for analy-sis; that the Reports of our Bureau of Health prove this city to be one of the healthiest in the United States, which is a practical evidence as to the quality of the water and to inclose you herewith a clipping taken from the Sunday Press of yesterday, showing the rela-tive mortality of the leading efficies which explains itself.

tive mortality of the leading cities, which explains itself."

The clipping referred to was a list of 38 of the chief cities of the world of which but two, Washington and San Francisco, have so low a death rate as Philadelphia.

There is much difficulty experienced in keeping the air-brake hose properly attached to the dummy coupling when the cars are disconnected, and it is no easy matter to fasten the responsibility for detached hose on in-dividual employés. We notice that many cars have the dividual employés. We notice that many cars have the dummy coupling attached to the body of the car by means of links which allow it to gyrate around in all directions excepting the most convenient one for coupling. In such cases as this the brakemen have to use two hands to hang the hose on the dummy, whereas when the dummy is rigidly attached to the car, as re-commended by the Westinghouse Air Brake Co. and by the Master Car Builders' Association, one hand is suffi cient, and it is believed that if all dummies were rigidly attached to the car there would be less complaint from hose hanging down and collecting dirt and grit.

We learn that the essay by Jon Quil, presented to the American Society of Railroad Superintendents, in the American Society of Railroad Superintendents, in competition for the prize for an essay on track work, was written by Mr. H. W. Reed, Master of Roadway, Savannah, Florida & Western Railway, who has been for some years the Secretary of the Roadmasters' Association of North America. An abstract of this essay was given in the Railroad Gazette last week, together with parts of the essays of Mr. Morrison and Mr. Hill. Secretary Hammond, of the Superintendents' Society, says that it is contemplation to print all of the essays presented, nine in number. presented, nine in number.

The London Engineering of Oct. 25 gives a fine illustration of the No. 10,000 Baldwin engine built for the Northern Pacific road, and shown in the Railroad Gazette Sept. 27. It is illustrated by an inset, showing clearly the details and dimensions by two cuts showing sections and end views, and a fine exterior view taken from a photograph which shows the location of the trim-mings and gives a good idea of the general style. Regarding this engine. Engineering says: "Altogether this type of engine is of very great interest, as showing what our American friends are now employing to deal with exceptionally heavy work."

We have received from M. Ch. Baudry, Chief Enginee. of Machinery and Material of the Paris, Lyons & Mediterranean Railroad, an extended description, of and memoranda on, the theory of the compound locomotives used on that road. Accompanying it is a series of cuts, 30 in number, illustrating the various features of the engines. It is a most interesting collection of infor mation with regard to the subject, extracts from which will appear in a later issue.

### NEW PUBLICATIONS.

Transactions of the American Institute of Mining Engineers. May, 1888, to February, 1889, inclusive.

This is one of the handsome and admirably indexed volumes with which all who are interested in matters treated by the Institute of Mining Engineers are familiar. It contains a great many papers, some of which have already been published by abstract or commented upon in the Railroad Gazette. The papers of special interest to our readers are those of Captain Hunt and Mr. F. A. Delano, on rail sections and specifications.

eport of the Proceedings of the Twenty-third Annual Con-vention of the Master Car Builders' Association. John W. Cloud, Secretary, 31 White Building, Buffalo, N. Y.

The contents of this volume our readers are already the contents of this volume our readers are already familiar with in a general way from the report made of the convention last summer. The discussions, however, are given in full, as are some of the committee reports which we only presented in abstract at the time of the convention. The most important paper embodied in this number of the Proceedings is the report of the Committee on Standard Brake Gear, which has already been mittee on Standard Brake Gear, which has already been published in full in the Ranlroad Gaz-tte. In this vol-ume of the Association's report the standard arrange-

The Midland Railway Company of England has issue a pamphlet describing engine No. 1,853, constructed at the Derby shops and exhibited at the Paris Exposition this year. This pamphlet also describes the Derby shops, and gives a profile of the Midland Railway and a timetable of the Scotch express, together with the fuel per-formance of the class of locomotives represented by No. 1,853 hauling that express. The pamplet also contains a diagram and a schedule of dimensions of the locomotive and tender. It can be obtained by addressing the Midland Railway Company.

#### TRADE CATALOGUES.

Catalogue and Price List of Thermometers, Barometers Hydrometers, etc., manufactured and imported by Taylor Brothers, Rochester, N. Y.

This is a very full and well illustrated catalogue showing forms of the various instruments adapted to many different uses. The catalogue of thermometers shows a design especially desirable for railroad purposes, as adopted by the Pullman Palace Car Co. It also shows elf-registering maximum and minimum thermometers clinical thermometers, etc.

The catalogue contains a short description of the aneroid barometer, with some general instructions for determining heights by its use, and a price list of a considerable variety of such barometers.

Ingersoll-Sergeant Rock Drill Co., Catalogue of Mining, Tunneling and Quarrying Machinery.

It is hardly necessary to say more about this catalogue than merely to mention the fact of its appearance. It is a volume of 184 pages, indexed, and contains a great deal of information upon machinery manufactured by this company. What this machinery is, are too well known to need comment. What this machinery is, and its reputation,

#### Foreign Railroad Notes.

In Germany, as elsewhere, railroad employés are the chief sufferers from railroad accidents. In 1887, while only 29 passengers were killed and 156 injured on the lines of the German Railroad Union, 398 employés were killed and 1,427 injured.

The Gotthard Railroad Co. has ordered of J. Maffei, of Munich, itts firs compound locomotive, which is to be of the Mallet type. It is claimed that this will be the most powerful locomotive ever constructed. It will weigh 187,000 lbs., and have six axles, coupled in two

A Berlin manufacturer is offering for sale an oil can with a small lantern attached, and a reflector, which is intended to enable the oiler to do his work without carrying a lantern in one hand and an oil can in the other. The lamp burns colza oil (a vegetable oil which still com-petes with petroleum on the Continent, and especially in France), and the oil-holder is inserted in the oil can, and serves to keep the lubricating oil warm in cold weather.

When the Hungarian zone tariff was introduced on the state railroads, two lines owned by companies, but guaranteed by the state, adopted the same tariff for their own systems; but a journey over connecting lines of these and of the state system was charged for as if it were two journeys. Early in October it was agreed that this should no longer be done, but that the tariff should apply on these connecting lines the same they were one system.

The Russian government is taking very decisive measures to regulate the railroads of the country, in some cases making serious reductions of domestic rates, and in others raising the rates on imports, for the purpose of checking them. The lines carrying iron from Germany and Silesia into Russian Poland are required to charge about two cents per ton per mile.

ment and sizes of brake gear are given in very clear and cheap and convenient for workmen traveling between their homes and their work. In many cases the rates for weekly and round-trip tickets have been reduced to one pfennig per kilometre (= ¾ cent per mile); special trains have been put on at such hours as served the workmen best, and the times of existing trains have been changed so as to accommodate them. Recently the several state railroad "directories" (each managing a system of from 800 to 2,000 miles) have been directed to give increased attention to the matter, and have received authority to extend the application of the one-pfennig

> The Saxon State Railroad Administration has recently published a history of the first 50 years of the Saxon rail-roads, which closed in 1887. At the expiration of that time the oldest locomotives in service were four, built in 1851 and 1852. The amount expended in maintaining 1831 and 1852. The amount expended in maintaining these four engines during their 35 years and more of service had been just about twice their original cost, which was from \$9,120 to \$9,690 each. The average yearly cost of maintenance, therefore, was about \$540 each, which is not more than half the average on some of our railroads. Doubtless, however, locomotives built in 1852 have not more than half the capacity of the present average Average average and the contract of th ent average American engine

> No less than 0.45 per cent, of the surface of Saxony— 25% square miles out of the total of 5,658—is occupied by its railroads, which are closer together than in any other European country except Belgium. The railroads cross the streets and highways no less than 5,134 times, and in 3,632 places on the level. The number of road crossings over the railroads is 332; under, 1,170.

> The first locomotives for Saxon railroads came from England, and only English coke could be burned in them. As Saxony is one of the great coal-producing countries of central Europe, and is far inland, this was a serious matter; but it was not for 18 years that the efforts to use Saxon coal succeeded completely. The economy is only partly indicated by the comparison of the cost of fuel per train mile in 1840, 30 cents, with the cost in 1887, 5% cents, as the train loads have enormously increased meanwhile.

> The company working what is called the Mediterranean system of the Italian railroads (owned by the government) at the beginning of its last year had 205 locomotives, 527 passenger cars, 123 baggage cars and 148 freight cars equipped with the Westinghouse brake; while 41 engines, 465 passenger cars and 73 freight cars were equipped with 400 passenger cars and 43 freight cars were equipped with the Smith-Hardy brake. Both together form but a small part of its equipment; it has 3,282 passenger cars. It ordered 80 new passenger cars this year, 40 of them with the Westinghouse brake, and 392 new freight cars, 50 with the Westinghouse brake.

> The leading railroad journals of Austria, as well as Germany, declare that it is hardly possible to hope for much practical benefit from the International Railroad Con-gress, which has recently closed its third session in Paris. The circumstances of different countries vary so that it is not often possible to make direct comparisons of experiences, and it is extremely difficult to collect data from all the different countries and reach such an understanding of them as to render any discussion profitable in the few days that the Congress sits. The Congress was called originally at the instance of the Belgian government; and it is easy to see that the Belgian railroads might desire a broader basis of experience than their little country could furnish, and might look for assistance to their big neighbors on either side. Reports of experience in certain definite directions coming from all countries ought, it would seem, to have a considerable value, but whether an International Raiiroad Congress is required in order to collect these on a uniform basis may perhaps be questioned.

## Contracting and Non-Contracting Chills.

dark nor light in color, rather a medium between the

dark nor light in color, rather a medium between the two.

Next on the subject of defects in car wheels: Chill cracks, rough treads, slag in tread, sweat and depression at throat, irregular depth of white iron, too small or too great depth of white iron, lack of roundness.

Railroads which inspect and test wheels, as they have the right to and should do, need not accept any wheels with the above-mentioned defects, and they are all specially described in well-known wheel specifications as reasons for the rejection of car-wheels; and, consequently, as users you might say that you were not interested in knowing how these defects were created, nor how they can be avoided. But, Mr. Barr having devoted a large portion of his paper to these defects, with the sole purpose of showing by inference, if not by direct statement, that they would all be avoided by using his contracting chill, and that they could not be so avoided by using any other, I ask your consideration to enable me to analyze the statements of Mr. Barr on this subject for exactly the opposite reason that he used them.

First: Chill cracks. Mr. Barr ays: "Hot and fast pouring increases the tendency to chill crack; cold and slow pouring prevents them." I admit all the bad effects stated of cold and slow pouring as claimed by Mr. Barr, but deny the inference that to avoid all this you will have to use the Barr chill. I deny the statement that hot and fast pouring increases the tendency to chill crack. We pour iron as hot and fast as Mr. Barr ever did pour iron into contracting chills, and our losses from chill cracks are not three wheels in one thousand; in fact, on our last month's report, eight molders out of ifteen, averaging over five hundred wheels apiece for the month, and aggregating over four thousand wheels, did not have one chill-cracked wheel among them; and further, the balance did not exceed the statement above (three in one thousand), and in every single case we could point to a reason for the chill crack outside of hot and fast pouring.

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could point to a reason for the chill crack outside of hot and fast pouring.

Secondly: Rough treads, slag in tread, sweat and depression at throat, irregular depth of white iron, too great or too small depth of white iron, lack of roundness. In all of these I agree with Mr. Barr that they are defects in car wheels, but deny the inference that to remedy them you must use the Barr contracting chill.

In Mr. Barr's paper was the statement that "when all contracting chills are substituted for common chills, the mileage will probably be doubled."

Statement says average mileage, all wheels, for 1888 . . . 70,478 Statement says average mileage, all wheels, for 1887 . . . . 68,554

statement says average mileage, all wheels, for 1885 ... 70,478
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Now, we will consider that slid wheels constitute no defect in manufacture (Mr. Barr says so), and that if wheels were not slid the mileage of all wheels would be increased. How much? Well, there is no condition of fair service which regulates the mileage of slid wheels. They may be slid the first day they go on, or on the day they would have come out for old age; so that it is fair to say that half the average mileage of all wheels represents the average mileage of slid wheels. Now, per Mr. Barr's statements, if the average mileage of all wheels in 1747, and there been no slid wheels this would have been increased by the percentage of the flat wheels to the whole on the basis of half the average mileage, or 35,239, 12 per cent. of which is 4,228 miles; consequently without 12 per cent. of flat wheels in 1885 miles; consequently without 12 per cent. of flat wheels in 1886 the average mileage would have been 74,766 miles. This is the true basis of comparison of the wearing quality of a wheel under fair treatment; for comparison the 1887 mileage given in statement being 68,554, the percentage of flat wheels was 30 per cent, which would add 8,282 miles to the general average (if there had been no flat wheels), or a total of 74,836 average miles of all wheels under fair treatment, as against 74,706 for 1888, showing that the general wearing quality of the wheel was falling off, and, by inference, the contracting chill was to blame.

Here follows a further recalculation of the results of service given in Mr. Barr's paper, in which the calculations made by Mr. Griffin are considerably different from those presented by Mr. Barr, closing with this statement; siven in this report, but will call your attention to the fact that the wheels of 1888 how an increase in perce

"The Griffin Wheel & Foundry Co. made one wheel, and one wheel only for each test.

"Test No. I represents a wheel made in the Barr contracting chill, with steam and water applied in the same manner and under the same directions as followed by the contracting chill people. The chill was first heated to the utmost possible limit, and the cold water was then turned on and the wheel started to pour at the same time. The time of pouring this wheel was 48% sec. The only variation in this test of the Barr chill from the regular instructions was in the time taken to pour. The result of this test showed a chill in the throat of the wheel of  $\psi_0$ -in., and in the centre of the thread a chill of  $\psi_0$ -in. The chill on the companion test piece, which is

also marked No. 1, being poured at the same time, out of the same ladle, showed \( \frac{1}{2} \) in.

"Test No. 2 was made in the Barr chill, and poured under the well-known instructions with steam and cold water in seven seconds of time: Result: Chill in throat of wheel \( \frac{1}{2} \) in. \( \text{in.} \) and in the centre of tread one inch. The corresponding chill on the test piece poured at the same time from the same ladle was \( \frac{1}{2} \) in.

"Test No. 3 was poured into the Barr contracting chill in \( \frac{7}{2} \) seconds, no steam or water being used. This wheel showed chill in throat of \( \frac{1}{2} \) in.

"Test No. 3.—This wheel was cast in ordinary chill, the time from same ladle was \( \frac{1}{4} \) in.

"Test No. 4.—This wheel was cast in ordinary chill, the time of pouring being eight seconds. The chill in the throat and in the centre of tread of this wheel was precisely the same, measuring \( \frac{1}{2} \) in. in each case. The corresponding chill on the test piece poured at same time from same ladle was \( \frac{1}{3} \).

"All of these wheels were poured from the hottest kind of iron, were taken direct from the cupola, the ladles also being hot in each case, one wheel being poured from same ladle in each case, out of each tap immediately before the test wheel was poured.

"I have examined the construction of these chills and the drawings from which they are made, and find them in every respect identical with the chill which is commonly known as Barr's contracting chill of the latest pattern. I can also attest to the fact that in each case I was advised as to what object was to be attained in each particular test, it being stated in regard to test No. 1 that pouring the iron slowly into the Barr chill, and following all other instructions, would produce a lighter chill on the wheel as compared with the centre of the tread, which statement appears to be verified by the result.

"The difference between test No. 2 and test No. 3 was only the absence of steam and cold water in No. 3

throat of the wheel as compared with the centre of the tread, which statement appears to be verified by the result.

"The difference between test No. 2 and test No. 3 was only the absence of steam and cold water in No. 3 as against their use in No. 2, the Griffin Wheel & Foundry Co. claiming that they would produce as good a chill on the wheel without the steam and water as they did with it, all other conditions being the same, and the result would indicate they have done so.

"Test No. 4, a wheel poured in an ordinary, common chill, such as is in use in their (the Griffin Wheel & Foundry Co.'s) foundry, was poured with iron just as hot as was the Barr wheel, in eight seconds of time, the Griffin Wheel & Foundry Co. claiming that they would produce as good a chill in the throat of the wheel as in the centre of the tread, as compared with the results obtained by Mr. Barr with steam, cold water and his contracting chiller. The result appears to support the position taken by them in this case.

"Report of shrinkage in Barr chill by quarter minutes obtained by the use of a lever acting as a dial, magnifying the expansion and contraction of the chiller twenty times as shown on accompanying table.

"First quarter minute showed ½-in. movement of dial or align of an inch actual contraction of chill.

"Third quarter minute showed ½-in. movement of dial or align of an inch actual contraction of chill.

"Fourth quarter, ½ of an inch actual contraction of chill.

"Fourth quarter, ½ of of an inch actual contraction of chill.

"Fitth quarter, ½ of of an inch actual contraction of shills."

Fifth quarter, ½ movement of dial, ¼ contraction of chiller.
"Sixth quarter, 30 movement of dial, 310 contraction of

chiller.

"Sixth quarter, ½ movement of dial, ½ contraction of chiller.

"Seventh quarter, no change in dial.

"Total contraction of chiller in one and three-quarter minutes ¾ or about ¾ in.

"The above contraction was obtained after having first heated the chiller to its utmost possible limit by steam as when in use, and then turning on cold water.

"This shows the maximum of expansion of the chiller to have been about ¾ in., and the contraction by cold water to have been the same. The steam used in making this test was taken from the dome through 20 ft. of connections, with a pressure of 80 lbs. to the square inch, and the cold water was put through at a pressure largely in excess of the city water pressure, which I understand is ordinarily used for service in contracting chillers. The boiler pressure being in the neighborhood of four times as great as city pressure would naturally throw the advantages, if any, towards the results to be obtained from using cold water, as a larger volume was necessarily put into service in the same period of time.

"I have examined these wheels and find that the chill on opposite sides or each wheel appears to be uniform. This applies to the wheel made in ordinary chiller as well as the others.

"I have also made careful note of the time of pouring by all the different molders in the foundry of the Griffin Wheel & Foundry Co., taking two wheels on each floor, or an aggregate of 30 wheels, and I find that the average time of pouring a 550-lb, wheel is 11 seconds."

You will see by this report that every statement which I have made, as opposed to the statements made

time of pouring a 550-lb. wheel is 11 seconds."

You will see by this report that every statement which I have made, as opposed to the statements made by Mr. Barr, so far as the results claimed by his contracting chill and the use of steam and water therein are concerned, has been proven to be correct. I have not sufficiently analyzed the subject to make a positive statement to that effect, but I have said, and I do say—and I believe I have fairly demonstrated—that the use of water and steam in a contracting chill is of no practical value, and that good car wheels with uniform chills in all parts can be made in common chills, and that iron can be poured as hot and as fast in one as in the other, and that so far as concerns the claims specifically made by Mr. Barr for the contracting chills as compared with common chills, I have demonstrated that they were not true.

Mr. Barr: I was taken unawares to-night. I didn't want to come here and stick contracting chills at you myself; that is, in a theoretical way. I expect to have contracting chill wheels themselves stuck at you, but not as a matter of theory—as a practical matter for you to try practically, and get results. I am almost compelled to say something here.

I won't say anything in my own defense as regards that part of Mr. Griffin's article in which he directly or indirectly—or however you may put it—charges me with dishonesty. About that I have got nothing at all to say; I cannot reply to it.

As to the matter of the statements that I made at the New York Railroad Club, those are all correct and straight; I hardly think that there is any one here who believes that they are otherwise. The whole records from which those statements were made are still in existence at Milwaukee, and if any one is sufficiently interested in them I shall take great pleasure in showing them. That is all I have to say on that part of the subject.

As to Mr. Griffin's test here, I think that I ought to say a few words. He shows two tests (I hope Mr. Griffin will correct me at once if I am mistaken) poured in the contracting chill, the time of pouring being something like 40 and 7 seconds.

Mr. Griffin's The first test was made in 48½ seconds, and the other two in 7½ seconds.

Mr. Barr: Now, Mr. Griffin, a practical wheel-maker, knows that the 40-seconds business is what makes the low chills; and to have shown you a complete comparison between the contracting chill and the ordinary chill he should have shown you a wheel poured in the common chill in 40 seconds out of the same metal.

Mr. Griffin's I fyou will permit me, I am willing to waive that discussion. Had I poured it in the common chill I agree that it would have been identically the same as it would have been in the contracting chill.

Mr. Barr: Then we will infer that this has no relation to the comparison between the two chills. It is understood that this case of 40-seconds pouring into the chill on the wheel is materially below the chill test.

Mr. Griffin: Read the report of the expert. It was claimed that by pouring it in 40 seconds the chill test werifies the statement.

Mr. Barr: The other two tests show good results, and show a chill on the wheel almost or quite equal to the chill on the chill blocks. The fourth test, in the common wheel, shows a chill on the chill test of \{3\cdot of an inch.

The chill on chill test No. \{4\cdot}, which corresponds with

The chill on chill test No. 4, which corresponds with exhibit No. 4, showing a wheel east in the ordinary chill, is about 1½. The depth of white iron on the wheel, measuring at the highest point, is a little over \( \frac{\chi}{\chi} \). Now, that is just exactly what I claim for the contracting chill; that is, that the chill on the wheel is very nearly equal to the chill on the test—that you don't need to make a high mixture, chilling an inch deep on the chill test to get a good half-inch on the wheel; and you all know how much the strength of a wheel depends on the hardness of the metal that is used in forming in body. That is one great troubie may be a subject of the chill on the wheel would equal the chill on a block like this, then you could use a lower grade of metal in the common chill and get a good chill on the wheel. If your chill on the wheel would equal the chill on a block like this, then you could use a lower grade of metal and make a much tougher and safer wheel. Now, any chill that will chill the wheel as it is on the chill test—if you could get such a chill—you will all agree, will make the best wheel. Mr. Griffin makes a point here that in these particular cases steam and water were not used.

Mr. Griffin and the chill on the one which did not a constant the wast foot of the chill on the one which did not have the water and steam is equal to the cne that did?

Mr. Barri I have simply to say with reference to that use of steam and water that I used the chill for a year without steam and water, and got a good wheel: I didn't get as deep a chill on the wheel as eep as the chill on the chill test, there was something failing in the device. I therefore went ahead to devise some method of giving an additional movement of the chill blocks.

Mr. Barri here drew a diagram on the blockboard to therefore a chill on the wheel as deep as the chill on the chill state. Now, in the wheel as deep as the chill on the chill state of the chill.

Suppose that to be a ring of metal of the proper shape to form—on th

the throat that it does in the centre of the tread.

Mr. Barr: The question is why this chill, poured in 48 seconds, shows less chill in the throat than in the mid dle of the tread. You are all doubtless familiar with the formation of this sweat or beads in the throat of the wheel; and, if you observe the wheel closely, you will find that there is a depression right in the throat. If you make a template of the chill and apply it, you will find

that it will fit along the tread and against the flange, but close in the throat there is a depression. When you look at the white iron on the chill you find that it is lower in the throat than any other place. Now, I would say that the reason that that is lower there than in the tread is simply because it was poured so slowly that the flange here had set and started to contract before ever the wheel was poured, and carried the shell of metal in the throat away from the chill, and stopped the chilling operation. It is unquestionably the cause of it.

Mr. GRIFFIN: Then, do I understand, Mr. Barr, that the limit of the value of the contracting chill with water and steam is based simply and solely upon fast pouring?

Mr. Barr: I scarcely see how you can understand that from what I have said. You show us a wheel here that is poured in eight seconds and has about 30 per cent, less chill on than the chill test, showing the chill of the metal from which it is poured. You show us a contracting chill here that is poured in the same time and has as much white iron in the wheel as on the chill test. They were both poured in the same time. What makes the difference?

Mr. GRIFFIN: I admit that it was not under fair condi-

were both poured in the same time. When the difference?
Mr. Griffin: I admit that it was not under fair conditions that I poured that wheel; it was 48 seconds—it was not your rule. Do you consider that the value of your contracting chill is based on the fast pouring of it, or

and sharffix: I admit that it was not under fair conditions that I poured that wheel; it was 48 seconds—it was not your rule. Do you consider that the value of your contracting chill is based on the fast pouring of it, or not?

Mr. Barr: It certainly depends on that, yes.

Mr. Griffix: Is there sufficient power in the water and steam to control it if the molder is careless and takes too much time?

Mr. Barr: If you pour a wheel and don't take advantage of the contraction of the chill, it is going to be a poor wheel. The best arrangement in the world can be ruined if it is not used right.

Mr. Griffix: Why is it that the chiller without the water produces as good a chill as with it? Here is a test that says that it does.

Mr. Barr: I say, absolutely, it does not. I have made hundreds of tests in which it did not show it. I can pour a wheel in the ordinary chill, and you can find some place on that wheel that is nearly as deep as the chill on the chill test. I would say this, as the result of continued tests between using the water and not using the water in the same make of chills, that the depth of white iron is about 20 per cent. greater using the water than not using it. Now, I don't say that I can demonstrate that on one wheel. I can't say to you "if you come to the foundry I will show you on two wheels that if we use the water on one the chill will be 20 per cent. —I can't say that. But I say, as an average, running the two for a month, that there is a difference in the depth of white iron of 20 per cent. in favor of using the water.

Now, this whole discussion don't really amount to very much. It is theoretical, and practical men know that theory is often very lame, and cannot be made to jibe with the practical results that you get in service. The way to settle this question about contracting chills and the common chill wheels and one truck with the common chill wheels and one tr

### TECHNICAL.

### Locomotive Building.

Locomotive Building.

The Pennsylvania shops at Altoona, Pa., last week shipped two large switching engines to the Indianapolis Division of the Chicago, St. Louis & Pittsburgh.

The Baldwin Locomotive Works, of Philadelphia, are building several large passenger engines for the Southern Pacific for service on the Louisiana Division.

The Louisville & Nashville has let the contract to the Rogers Locomotive Works for 10 consolidation freight engines and 10 switch engines, in addition to the 20 recently received.

The Cincinnati, Jackson & Mackinaw has let the con tract for building five new engines.

### Car Notes.

The Cincinnati, Jackson & Mackinaw has let a contract to the Haskel & Barker Car Co., of Michigan City, Ind., for building 500 box cars.

The Riordan Refrigerator Car Co. is to build 300 refrigerator cars to run on the Richmond & Danville; also 100 to run on the East Tennessee, Virginia & Georgia, in addition to the 100 already built for the use of this road. The Missouri Pacific is having built, at the Pullman Works, five sleeping cars to run between St. Louis, Pueblo and Denver.

The Pullman Works are building 300 Wickes refrigera-tor cars for the Merchants' Dispatch, and the Michigan Car Co. is building 80 of the cars.

Car Co. is building 80 of the cars.

Bridge Notes.

The Central Iron Bridge Works, of Peterboro, Ont., has secured the contract for the new Grand Trunk bridge at Campbellford, Ont. The iron work for the new bridge at Yarker, on the Napanee, Tamworth & Quebec road, is now being shipped. The capacity of this company has been increased fourfold during the past year by the addition of several large buildings, the main one being 150 × 80 ft. The works now give employment to 130 men.

the election in that city Nov. 5, the necessary two-thirds vote not having been obtained.

ote not having been obtained.

The Cincinnati, Hamilton & Dayton and the Lake Eric Western are building an iron bridge over the Ottawa liver at Lima, O.

It is presented.

River at Lima, O.

It is proposed to build an iron bridge across the river about a mile below South St. Paul, Minn., to cost about \$300,000. The City Engineer, A. S. Weymouth, is now surveying for the proposed bridge.

Work is progressing on the Hawk street viaduct in Albany, N. Y. The piers are completed, and work on the superstructure begun.

The City Council of Reading, Pa., and the County Commissioners are considering a project to build a third bridge across the Schuylkill River.

Work on the new bridge of the Philadelphia & Reading over the Schuylkill River at West Falls is being pushed rapidly. One of the river piers is nearly completed and the shore piers are already finished.

Work has been started on the large bridge of the Morris and Brandon branch of the Northern Pacific & Manitoba across the Souris River. G. W. Buchanan is the contractor. The bridge will be a double deck, passengers and teams passing below and trains above. The central span will be 130 ft. wide, the remainder being trestle work.

The new iron bridge at Dresden, Ont., has been swun into position and is now open for traffic. Whitebread & Smith were the contractors.

trestle work.

The new iron bridge at Dresden, Ont., has been swung into position and is now open for traffic. Whitebread & Smith were the contractors.

It has been decided to replace the old bridge across the Thames River, in which the counties of Elgin, Kent and Middlesex, Ont., are interested, with an iron bridge costing between \$20,000 and \$25,000. The new structure will consist of two spans of 126 ft. each, with stone and iron abutments and a stone pier.

It is understood that the lowest tender for the construction of the bridge across the Rideau Canal, at Ottawa, is \$5,000, not including the steel swing, which will cost about \$1,000 more.

The South Capitol Street & Giesboro Bridge Association held a meeting in the National Hotel, Washington, D. C., this week, and elected the following officers: A. K. Browne, President; P. Mann, Vice-President; P. Heiskell, Secretary, and R. J. Beall, Treasurer.

The New Haven (Conn.) Board of Public Works is reported to have adopted the following estimates for work next season: Chapel street railroad bridge, \$1,000; Webster street railroad bridge, \$2,600; Rock Lane bridge and approaches, \$5,300; De Witt street railroad bridge, \$3,000; Derby avenue bridge, \$8,000; two bridges, Bridge street causeway, \$3,000; Orange street bridge, \$15,000.

The New York State Supreme Court has affirmed the decision of the lower court denying the application of the New York & Long Island Bridge Co, for the appointment of Commissioners to appraise the value of so much of Blackwell's Island as may be required for the proposed bridge from Thirty-fourth street, New York, across the East River. The original act under which the petitioner was incorporated did not provide for a railroad bridge, while the petitioner seeks to build no other than a railroad bridge. The opinion also declares that the company has forfeited its new charter by failure to begin work before May 30, 1889.

The following bids were received by the City Engineer of Providence, R. I., for building an iron bridge at Manton Villa

### Manufacturing and Business.

The Michigan Central has given an order for 1,000 kegs of Goldie spike, manufactured by Dilworth, Porter & Co., of Pittsburgh, Pa. Byram & Co., of Detroit, Mich., have sold two cupolas to the Westinghouse Air Brake Co., and another to the Baldwin Locomotive Works, Philadelphia.

Baldwin Locomotive Works, Philadelphia.

The contract for the mason work of the State House extension at Boston has been awarded for \$622,000 to Norcross Bros., of Worcester, Mass., who built the station of the New York, New Haven & Hartford in Hartford, and are now building the station of the Boston & Albany in Springfield.

It is stated that English parties are endeavoring to purchase the property of the National Tube Works. The company is now paying dividends of 2½ per cent. quarterly, and the surplus is reported to equal the capital stock. The last sale of stock was made at \$150. The par value is \$100. It is understood that the sales of the company this year will aggregate nearly \$13,000,000, and will show about \$1,250,000 profit, or 50 per cent. on its share capital. The company to-day has about all the orders it can handle.

The National Paint Works, of Williamsport. Pa., has.

which none of the others did. The estimate for the bridges is about \$3,000.

The John Doty Engine Co. is enlarging its works at Toronto. The engine and machine shop will be 245 × 80 ft.; boiler shop, 200 × 80 ft.; blacksmith shop, 100 × 70 ft.; and foundry, 200 × 70 ft. The company has acquired about three acres of land opposite its present works, upon which the new buildings are being erected. In addition to the shops a building 100 × 70 ft. and three stories high is being constructed, on the ground floor of which will be the company's offices and show rooms, The upper floors will be used for drafting rooms, stowage of machinery parts, fittings, etc. The company has decided to open a shipyard at Collingwood, Ont. The electors of that town will soon vote on a proposition to grant the company a bonus of \$2,500 for each steamer costing not less than \$40,000, built by it, until 16 steamers have been completed. The shipyard plant will come from Glasgow.

#### Iron and Steel.

Iron and Steel.

The Homestead Mills of Carnegie, Phipps & Co. are, it is stated, to be enlarged by the addition of eight open-hearth steel furnaces. The old buildings are now being pulled down to make room for the new plant, and the plans for the improvements are about prepared.

The work on the two blast furnaces now being erected at the Edgar Thomson Steel Works is progressing, and it is expected to have one of the furnaces ready for blast by Jan. 1.

at the Eugar Thomson Steel Works is progressing, and it is expected to have one of the furnaces ready for blast by Jan. 1.

It is reported that the Carpenter Steel Co., of Reading, Pa., of which Gen. John Newton, of New York, is President, has decided to locate its steel works permanently in that city.

J. P. Witherow & Co., of Pittsburgh, are arranging contracts for the erection of extensive plants, blast furnaces and rolling mills, at Cumberland Gap, Tenn., and furnaces at Sheffield and Birmingham, Ala.

It is reported that the Tennessee Coal, Iron & Railroad Co. and the Debardeleben Coal & Iron Co. will be consolidated. The two are the largest coal and iron companies in the South, and if consolidated would be the largest in the United States. The two companies own 20 furnaces in Alabama and Tennessee, numerous mines, and about 500,000 acress of valuable mineral lands.

The Oliver Iron & Steel Co., a part of whose plant was recently destroyed by fire, will soon commence building a larger structure to cost about \$100,000.

The Northampton Blast Furnace of the Bethlehem Iron Co., at Freemansburg, near Bethlehem, Pa., which has been idle for several years, is to be blown in again. The company is blowing in all its idle furnace.

The output of the Union works of the Illinois Steel Co. for October, working 54 turns, was 38,232 gross tons of ingots and 23,494 gross tons of rails. The best week's work on ingots was for the week ending Oct. 19, with a tonnage of 8,549 tons 2,130 lbs. The best week's output of rails was for the week ending Oct. 26, with a tonnage of 6,766 tons 1,070 lbs. The best 24 hours' run was on Oct. 8, with a tonnage of 1,639 tons 520 lbs. of ingots, and 1,312 tons 1,354 lbs. of rails. The best 12 hours run on rails was on the day turn of Oct. 8, making 600 tons 718 lbs.

A by-law providing a bonus to the Belleville Rolling Mills Co. will be voted on in Belleville. Ont.

rais was on the day turn of Oct. 8, making 699 tons 718 lbs.

A by-law providing a bonus to the Belleville Rolling Mills Co. will be voted on in Belleville, Ont., next week. The company has a capital of 850,000 for the manufacture of iron and steel. Upon the erection of a plant, with a capacity of 60 tons per day, employing 80 men, \$12,000 will be paid by the town of Belleville, and also \$2,000 annuals for the next five years, provided the employes number 250 by the end of that time.

The Secretary of the Navy has awarded the contracts for steel shapes and steel plates to be used in constructing the cruisers to be built at the New York and Norfolk Navy Yards. Carnegie, Phipps & Co., of Pittsburgh, were awarded two contracts at \$65,856 each for steel plates, and two others for steel shapes at \$20,100 each. The Linden Steel Co., of Pittsburgh, was awarded two contracts at \$27,604 each for steel shapes.

## The Rail Market.

The Rail Market.

Steel Rails.—There are a considerable number of inquiries in the Eastern market, but few in the West. Quotations vary very much, some mills asking \$35, but from \$33 to \$34 is generally quoted in the East. Pittsburgh mills have sold a lot of 6,500 tons for Kansas City delivery, and quotations are \$330 \$34 cash at mill. Chicago mills are busy, and quote \$35 for next year's delivery.

Old Rails.—The market is quiet with few sales or inquiries, but holders anticipate a better market, and the stock is held firmly. Quotations are: \$24.50@ \$25 in New York, \$27 at Pittsburgh for old iron rails and \$21.50@ \$22.50 for old steel rails. At Chicago old iron rails are held at \$25.50, buyers offering \$25.50. Old steel rails are held at \$19.50@ \$20.

Track Fastenings.—Quotations remain unchanged for

Track Fastenings.—Quotations remain unchanged for spikes and angle bars.

Electric Street Railroad at Buda Pesth.

Buda-Pesth, Hungary, now has an electric street railroad which is claimed to be the largest in existence. The current is supplied through a cable in an underground beton conduit between the rails, and suitable contact pieces descend into it from the cars through a slot. The cars used are of the regular street-car pattern and present nothing unusual in appearance. Power is furnished from a central station, which bears the distinction of being the first Hungarian plant for electric power transmission. The station, at present, is fitted up with three boilers, three 100 horse-power engines, and three dynamos. The whole outfit was supplied by the well-known German firm of electrical engineers, Messrs. Siemens & Halske, of Berlin.

### **Economy of High Pressures**

terly, and the surplus is reported to equal the capital stock. The last sale of stock was made at \$150. The part the call consumption of locomotive dition of several large buildings, the main one being 150 × 80 ft. The works now give employment to 130 men. An iron bridge is projected across San Gabriel River, near Taylor, Williamson County, Tex.

The Board of Public Works of Toronto, Ont., have decided to appropriate \$30,000 for an iron bridge across the Rosedale Ravine from Sherbourne street.

The Lock and Canal Co. has agreed to bear part of the expense of building a bridge over the canal on Merritage across the Union Passenger road has been given permission to build a bridge over the tracks of the Philadelphia & Railong, over Ninth street, on Columbia avenue, Philadelphia.

The proposition to issue \$250,000 five per cent, bonds to build a new bridge at Topeka, Kan., was defeated at the past year by the addition of several large sales to car shops.

The Lock and Canal Co. has agreed to bear part of the expense of building a bridge over the canal on Merritage and the proposition to issue \$250,000 five per cent, bonds to build a new bridge at Topeka, Kan., was defeated at the past year by the above was made at \$150. The part of the last sale of stock was made at \$150. The part of the last sale of stock was made at \$150. The part of the last sale of stock was made at \$150. The part of the last sale of stock was made at \$150. The part of the last sale of stock was made at \$150. The part of the last sale of stock was made at \$150. The part of the last sale of stock was made at \$150. The part of the last sale of stock was made at \$150. The part of the same and the capital stock. The last sale of stock was made at \$150. The part of part of the same and the capital stock. The last sale of stock was made at \$150. The part of the same about all the orders it can handle.

The Calcalman the capital the capital stock. The last sale of stock was made at \$150. The part of the same and the capital stock. The last sale of sto

experiments being made not only is particular note made of the quantity of coal burned, oil used for lubricating and water evaporated, but also the gradients on the journey, the weight of load, and the state of the atmosphere.—The Engineer.

## Consumption of Wooden Ties on French Rail-

In the fourth of a series of articles on the consumption of wooden ties on French railroads, published in the Revue Générale des Chemins de Fer, Mr. Henry Mathieu, Honorary Engineer-in-Chief of the French Midland Railroad, gives a number of interesting tables and facts bearing on the consumption of ties for both maintenance and new construction during the years 1887 and 1888.

name and new construction during the year active 1888.

Mr. Mathieu places the mileage of the six principal railroad companies of France and of the government lines at 90 per cent. of the total length of all French roads and figures on the known data for these in arriving at the final result. Considering the heavier traffic on these lines, it should be borne in mind that the figures thus obtained are slightly higher than is actually the case. From the first table given, for 1887, it appears that the tie consumption for the government lines and the six roads referred to was:

For maintenance of way. 2,232,968 ties.

For maintenance of way.

Total. 2,981,275

The number of native ties was 2,461,675, while the foreign supply amounted to 166,811 ties. Proceeding as before, Mr. Mathieu places the total consumption for 1888 at 2,521,270 ties. The corresponding totals for the four preceding years were:

..... 4,204,119 ties. | 1885 ..... 3,641,441 " | 1866.

railroads and the government has final figures.

Electricity on Street Railroads.

Executive Committee off Electricity on Street Railroads.

The report of the Executive Committee of the American Street Railway Association, at the Minneapolis Convention, contains the following significant paragraph: "During the last few years, each succeeding year has seen electricity progress far more rapidly than any other power that has come to our notice; and this has been especially so in the organization and operation of new roads. To no one department of our business has so much attention been paid, during the last year especially, as to that of motive power. At best, we have come to regard the street railway as a machine by which horses are too rapidly used up; and for reasons of humanity, if for no other, the managers of street railways feel that they should do all in their power to substitute some other motive power for that of animals. If, and when, it is practicable to do this at a much less cost, to say nothing of the greater satisfaction in operation, it is manifestly our duty to do so."

Explosive Mixtures of Petroleum Vapor.

Explosive Mixtures of Petroleum Vapor.

Experiments with petroleum vapor have shown that air mixed with 5 per cent. of the vapor does not explode when, however, the proportion rises to 6.25 per cent. a slight explosion takes place, while with 8.3 per cent. the explosion becomes violent. The most violent explosion takes, place, however, with from 11 to 12 per cent. of vapor, beyond this limit the violence of the explosion decreases, and when the air contains 20 per cent. of the vapor no explosion occurs.—Engineering.

Piper's Semaphore Signal.

Piper's Semaphore Signal.

Signals of this pattern have been erected at the crossings of the Northern Pacific & Manitoba and the Canadian Pacific at Fort Whyte, Headingly and Morris, Man. The post consists of a square, hollow box in which the lamp is raised to its elevated position by means of a chain, the attendant standing on the ground. The home signal for a crossing consists of a single post with two arms, one at right angles with each road. Each arm answers for both directions on its respective road and they are interlocked, so that when one is at "all clear" the other must be at danger. Distant signals are provided in each of the four directions at a distance of 1,700 ft.

The Triph Roller Bearing.

The Tripp Roller Bearing.

The Tripp Roller Bearing.

Roller bearings for various devices in railroad shops are looked upon with favor, particularly for transfer tables and trucks for transporting work and material about the shops. To some extent roller bearings are believed to be advantageous for car journals, and as several Western and one or two Eastern roads are now experimenting with them, the following information regarding the Tripp roller bearing will be of interest.

Car 158 on the New York & New England, equipped with the Tripp bearings, commenced running Jan. 25, 1889, and up to Aug. 14, 1889, had made 19,937 miles. On that date the trucks were changed from under car 158 to car 156, and put on the run between Boston and Philadelphia, and up to Saturday morning, Sept. 26, the bearings had made 37,082 miles. This car is now making 381 miles daily on the Washington fast express train. In August a dynamometer test of the bearings, then under car 158, was made in the yard of the New York & New England by

J. B. Henney, Superintendent of Motive Power, and other officers of the road, and in the presence of representatives of the Thomson-Houston Co., and many others. The test on car 150 and on car 156, with the Master Car Builders' standard journals, showed a strain of 600 and 800 lbs. respectively, and on the 12-wheeled Pullman car "Clypso" a strain of 700 lbs., a veraging for three cars 700 lbs. Car 158, with roller bearings, was moved with a strain of 250 lbs., a reduction of 60 per cent.

The device of a skeleton frame for perfectly controlling the rolls, and holding their axes, when out of duty, and bringing them into duty, in perfect line with the axis of the shaft, is a feature of this bearing. The rolls used are of ordinary steel, in the same state of hardness as when cut from the bar, and in the bearings now running (from Boston to Philadelphia) the rolls have not worn your of an inch, and are uniform in size from end to end. The top of box, where the rolls bear most, shows no depression. The side motion with this bearing is controlled by a collar each side of an end thrust plate, and two leatheroid, washers, one each side of thrust plate, between it and collars, in each box. The thrust plate is held firm by the outside cap when serewed on. The area of thrust bearing is 63 sq. in. The box is dust proof, being packed on the back end with packing having an expansive core, and holding the lubricating material free from dust and water during the life of an ordinary chilled wheel. Another feature of this box is, that when the brakes are applied, the strain comes on the rolls opposite the brake shoe, and the axles run freely.

A set of these bearings has run over two years, with one lubrication, under a 5,000-lb. street car with its usual number of passengers, and with the usual number of times off the track, with no detrimental wear. There are now about 30 cars running with these bearings; it is also being used on several motors for street cars, and on stationary motors, shafting and various other devices, wher

### A New Friction Device.

A New Friction Device.

An enterprising American mechanic is attempting to drive dynamos and other machinery by a new friction device which has on its face some promise of merit. Two pulleys with flat faces are brought together and between them is placed an endless leather belt which is somewhat longer in circumference than one of the pulleys which it surrounds. The pulleys are then drawn together with a screw. Experiments with this device have shown that power can be transmitted by it with as little loss as in any other way, and has the advantage of being applicable to many cases where the use of pulleys is undesirable. Perhaps this would be a good device to use in driving dynamos in railroad trains.

#### Friction Tests of Journal-Bearing Metals.

ave received the following report of tests ma . H. G. Torrey, for the Magnolia Anti-Friction

Metal Co.:
At your request I have made several friction tests of journal-bearing metals. Those selected were your own magnolia metal, taken from the stock as made day by day, and Hoyt's genuine babbitt and the deoxidized genuine babbitt, the latter two supposed to be the best of their class. The machine used used was a 5-in. shaft on a 3-in. shaft lubricated with sperm oil, 5-in. shaft running in the oil. With light pressures and slow revolutions of shaft the metals showed little difference, but with rapid revolutions and heavy pressures magnolia metal showed great superiority. Herewith is is a detailed statement of the test of the three metals:

TIME OF TEST, ONE HOUR.

	Ter	mperatu	ire.			shaft	SHF
minutes.	a anti-	genuine	ized genu- Babbitt	Pounds p	of	of rubbing per minute .	
Time in	Magnolia friction	Hoyt's Babbit	Deoxidized nine Bab	Two genuine Babbitt's.	Mag- nolia.	Revolutions per minute	Speed c
0 10 20 30 40 45 50 60	Deg. F. 65 115 150 160 180 270	Deg. F. 90 156 180 230 345 397	Deg. F. 90 140 170 230 320 330 375	Lbs. 200	Lbs. 300 300 500 800 1,000 1,000 1,000 1,000	1,550 1,550 1,500 1,500 1,500 1,500	Ft. 2,095 2,030 2,030 1,965 1,965 1,965 1,965 1,965

REMARKS.—Magnolla ran full time, free, without melting ut or stopping machinery.
Hoyt's melted and stuck to shaft at end of 45 min.
Deoxidized genuine babbitt melted and stuck to shaft at nd of 55 min.

New Station of the Boston, Revere Beach & Lynn. New Station of the Boston, Revere Beach & Lynn. The company is erecting a new station on Atlantic avenue, Boston, on the site of the old one. The building will be 116 ft. deep and 62 ft. front, of brick, with freestone trimmings, and when completed will have cost about \$60,000. The contractors for the mason work are Howard, Coon & Co., of Boston, and for the iron work the Boston Bridge Works. The plans were prepared and the structure designed by Mr. C. A. Hammond, Superintendent of the road; George Finneran, Architect, and Edward S. Shaw, Consulting Engineer, of Boston. Pending the completion of the new station, the company is occupying a building on Rowe's Wharf, where a temporary ferry landing has been constructed. It is expected that the new station will be completed by April 1.

these delays, the passengers and officers of the "City of New York" think that the "Teutonic" would have been beaten by about 50 minutes Meither of the steamers made her best record on this trip, the "City of New York" having previously made the western voyage in 6 days 4 hours 17 minutes, and the "Teutonic" in 6 days 6 hours 29 minutes. The distances run by the steamers only differed by four nautical miles. The daily runs are amended:

-			Di	stanc	Run, Nautical	Miles.
					"Teutonic."	"City of New York."
To	noon,	Nov.	. 1		330	354
64	8-6	66	2		420	417
44	0.6	6 -	3		461	461
4.6	44	4.6	4		470	474
6.6	6.6	4.6	5		482	482
6.6	66	4.6	6		495	478
6.6	5:05 p.	m.	66			110
6.6	5:14		44		116	***
						1900-00

The Emerson Car Heating System.

The Emerson Car Heating System.

James Emerson, of Holyoke, Mass, whose system of continuous steam heating has been in use on the Connecticut River road for two or three winters, recently fitted up a train of that road with connections for utilizing the old Baker heaters and pipes with more facility than has heretcfore been possible. By a special heating device he takes water from the tender, heats it and forces it into the pipes throughout the train. This heater consists of a sleeve over a hot steam pipe, and the Baker pipes of a medium-sized train can be filled with hot water in two minutes. This is intended to be done whenever it becomes necessary to detach the engine from the train. A fire can then be started in the Baker furnace and circulation readily established before the car gets cold. The train was exhibited last week to the Massachusetts Railroad Commissioners.

#### THE SCRAP HEAP.

The Vandalia Line is trying electric headlights on two of its passenger engines.

About two months ago the pay car of the Illinois Central was robbed of \$2,500 one night at Jackson, Tenn. A few weeks after the Paymaster, Mr. John T. Watkins, was the recipient of a present of that amount, which had been contributed by the employes of the Southern

was the recipient of a present of that amount, which had been concributed by the employés of the Southern Division.

The strike of yard trainmen on several roads at New Orleans, which began in a small way last week, extended to all the roads in the city last Thursday, about 100 men being involved. The railroads had little difficulty, however, in getting new men, and at last accounts the old ones had begun to come back.

The strike of freight trainmen on the Evansville & Terre Haute, which suspended freight traffic on that road for two or three days last week, was settled on Thursday, the leompany granting a considerable advance in wages. Dispatches state that five strikers were arrested for interfering with mail trains, and that coupling pins were stolen from a freight train.

The court at Galesburg, Ill., has dismissed the Chicago, Burlington & Quincy dynamite conspiracy case against Clark and Meilly, of Galesburg, and Bauereisen, of Aurora, and John A. Bowles, the informer, which has been pending for two or three terms. After being released by the United States Court Bowles suddenly disappeared, and all efforts to discover him have proved unavailing. The state's attorney said that the case could not be tried without Bowles, as he was the principal witness for the state. The judge concurred in this view and dismissed all four of the delendants.

The Pennsylvania engine which has drawn the excursion train of the All-America Congress over a large number of roads during the past month was equipped with five special devices not usually found on a single locomotive. These were: Dynamo for lighting the train, pump for furnishing water to the dining and other cars, steam-heating apparatus for heating the train, air signal (in place of bell rope) and special connections for lighting the headlight of the engine and the tail lights at the rear of the train by electricity. This fact has been published as an answer to critics who thought each road should have furnished its own engine for hauling this train.

Railroad Taxe

Railroad Taxes in New Jersey.

Railroad Taxes in New Jersey.

The New Jersey State Board of Assessors has completed the work of assessing the various railroad systems of the state. There are about 2,000 miles of road, owned by 89 companies, and 173 miles of canal. The total amount of the tax for the year is \$1,329,608, against \$1,316,282 last year, an increase of \$13,326.

The increase in the assessed valuation of the Pennsylvania system is \$867,350; Central system, \$1,361,412; Philadelphia & Reading, \$393,088; New York, Lake Erie & Western, \$253,264; and on railroads not classified, \$881,303. These systems will pay into the state treasury taxes as follows:

ennsylvania																
entral			- 0					* 4	×				6	6 1	ĸ	. 288,
hiladelphia & Reading							 									. 30,
ew York, Lake Erie &	11.	es	te	rn												. 117.
elaware, Lackawanna	80	W	es	te	ri	1.									C	. 264.
ew York, Susquehanna	1 8	1 3	V	28	te	rı										. 27.
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Shop Rules.

nut cutting; soft soap and water must be used. The rules concerning waste of time are very strict, a black-smith's striker, for instance, being forbidden to fetch iron or coal to his fire, this work being allotted to another man. Any workman using any of the company's materials for washing his hands, except under the approval of the foreman, will be fined one shilling. Overtime of mechanics is paid 25 per cent. above regular wages until 10 p. m., 50 per cent. additional for the next two hours, and at double rates for the next six, and on Sundays. No overtime is allowed until a full week's time has been made. The working hours are as follows, the week consisting of 54 hours, and beginning Friday morning:

morning:
Tuesday, Wednesday, Thursday, Friday.

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#### Florida Railroad Lands.

Florida Railroad Lands.

All the unsold lands in Florida of the "Plant System" of railroads and steamships, of the Florida Southern, and of the Jacksonville, Tampa & Key West system, including the Florida Commercial Co., have been consolidated under the name of the Associated Land Department of Florida, with headquarters of the syndicate at Sanford, under the management of Col. D. H. Elliott, as general agent. Over 6,000,000 acres of land are consolidated under one management by the formation of this syndicate.

#### Bridges over Navigable Waters at Boston.

Bridges over Navigable Waters at Boston.

The Boston & Maine has prepared a memorial to the Secretary of War protesting against his recent order requesting the railroad corporation to alter its four bridges over the Charles River before Jan. 1, 1891, "so as to render navigation free, easy and unobstructed." The corporation sets forth that it is the representative and trustee of vast public interests, and is bound to the best of its ability to protect them from injury; that the railroad freight exceeds many times in quantity and value the river freight, and that the order is vague in its terms. The corporation protests against the order as of doubtful legal validity; as unjust and inequitable in its practical working; as rendering its powers and duties under state legislation indefinite, and as inevitably postponing the prosecution of a great public improvement [the proposed union passenger station], wherefore it petitions that the order be revoked, or the act of Congress under which it is made be repealed.

State Control in Iowa.

gress under which it is made be repealed.

State Control in Iowa.

The Iowa Railroad Commissioners on Saturday last rendered a decision in what is known as the Mount Ayr case, affecting the running of trains on branches. The people of Mount Ayr, in Ringgold County, complained to the Commissioners that the Chicago, Burlington & Quincy was giving them insufficient train service, running only one train each way a day, and that a mixed train. Mount Ayr is on the Chariton & Grant City branch. The Commissioners say that the road in computing the value of a branch should not estimate simply the income of the branch itself, but also the effect which the branch has upon the main line in turning traffic toward it. They cite the case of the Union Pacific, which maintains branch lines as feeders even when they do not pay expenses, and they order the company to put on a passenger train each way daily. Commissioner Dey dissents, holding that the mixed train is sufficient, provided that it runs on schedule time.

A Railroad up Mt. Dunderberg.

### A Railroad up Mt. Dunderberg.

A Railroad up Mt. Dunderberg.

A certificate has been filed with the Secretary of State, at Albany, N. Y., by the Dunderberg Spiral Railway Co., which proposes to construct a circuitous railroad 15 miles long, from a point one mile southwest of Jones Point, near the Hudson River, in Rockland County, northwesterly to the summit of Dunderberg Mountain. The descent will be by a more direct route. The conveyance of persons will be by means of a propelling rope or cable, attached to stationary power. The company has a capital of \$750,000.

### General Railroad Meme.

### MEETINGS AND ANNOUNCEMENTS.

### Dividends.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago & Alton, quarterly, 2 per cent. on the preferred and common stock, payable Dec. 2.

Chicago & Eastern Illinois, quarterly, 1½ per cent.

Cincinnati, Sandusky & Chereland, 3 per cent. on the preferred stock, payable Nov. 1.

Chereland & Pittsburgh, quarterly, 1¾ per cent., payable Dec. 1.

Kansus City, St. Louis & Chicago, quarterly, 1½ per cent. on the preferred stock, payable Nov. 1.

Luna & Baston, 4 per cent. on preferred stock, payable Nov. 1.

Manchester & Lauvence, 5 per cent. on the preferred stock, payable Nov. 1.

Nashua & Louell, 4½ per cent., payable Nov. 1.

North Pennsylvania, quarterly, 2 per cent., payable Nov. 2.

Meetings.

### Meetings

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Alberta Railway & Coal Co., special, London, Eng., Dec. 2, to consider agreements entered into with other companies.

Altuntic & North Carolina, special, Newbern, N. C., Nov. 21, to consider a proposed extension.

Buffalo. Bochester & Pattsburgh, annual, 36 Wall street, New York City, Nov. 18.

Chicago, Kansas & Nebraska. special, Topeka, Kan., Dec. 3, to consider a trackage agreement with the Kansas City & Beatrice.

East Tennessee, Virginia & Georgia, annual, Knoxville, Tenn., Nov. 20.

East remesser, 1 by the Control of t

ec. 10. Georgia Pacific, annual, Birmingham, Ala., Nov. 27. Manitoba & Southeastern, annual, Winnipeg, Man ec. 10

Dec. 10.

Montgomery, Tuskaloosa & Memphis, special, Mont-

gomery, Ala., Nov. 18, to vote on a proposed increase of the capital stock.

New York. Lake Erie & Western, annual, 21 Cortlandt street, New York City, Nov. 26.

New York. Danbury & Boston, annual, 96 Broadway, New York City, Nov. 25.

Suspension Bridge & Erie Junction, annual, 2 Cortlandt street, New York City, Nov. 26.

Tennessee Milland, annual, Memphis, Tenn., Dec. 4.

#### Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The American Society of Mechanical Engineers will hold its annual meeting at its rooms, 64 Madison avenue, New York, from Nov. 18 to Nov. 22.

The New England Railroad Club meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

second Wednesday of each month, except sune, san, and August.

The Western Railway Club holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The New York Railroad Club meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The Central Railway Club meets at the Tift House, Builfalo, the fourth Wednesday of January, March, May, August and October.

The Northwest Railroad Club meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.

day of each month in the St. Paul Union Station at 1:00 p.m.

The American Society of Civil Engineers holds its regular meeting on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The Boston Society of Civil Engineers holds its regular meetings at Boston, at 7:30 p. m., on the third Wednesday in each month. The next meeting will be held at the American House.

The Western Society of Engineers holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The Engineers' Club of St. Louis holds regular meetings in St. Louis on the first and third Wednesdays in each month.

month.
The Engineers' Club of Philadelphia holds regular meetings at the house of the Club, 1,122 Girard street, Philadelphia.
The Engineers' Society of Western Pennsylvania holds regular meetings on the third Tuesday in each month, at 730 p. m., at its rooms in the Penn Building, Pittsburgh,

Pa. The Engineers' Club of Cincinnati holds its meetings at the Club rooms, No. 24 West Fourth Cincinnati, at 8 p. m., on the fourth Thursday worth

month.
The Engineers' Club of Kansas City meets at Kansas City, Mo., on the first Monday in each month.
The Civil Engineers' Society of St. Paul meets at St. Paul, Minn., on the first Monday in each month.
The Montana Society of Civil Engineers meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.
The Civil Engineers' Club of Kansas holds regular meetings on the first Wednesday in each month at Wichita, Kan.

Kan.

American Society of Civil Engineers.

At the meeting of Nov. 20, 1889, a paper on "The Results of Investigations Relative to Formulas for the Flow of Water in Pipes," by Edmund B. Weston, M. Am. Soc. C. E., will be read and discussed.

The annual meeting will be held Jan. 15, 1890, at the Society House in New York, beginning at 10 o'clock. The annual reports will be presented; officers for the ensuing year elected; amendments to the constitution discussed and general business transacted.

suing year elected; amendments to the constitution discussed and general business transacted.

Engineers' Club of St. Louis.

A regular meeting was held on Nov. 6, at Washington University, President Meier in the chair; 32 members and five visitors present. Mr. Western R. Bascome was elected a member.

The committee on permanent location of the club recommended the renting of a room in the Laclede Building, and arrangements for the use of the Elks' Club room for meetings. The report was adopted, and the Executive Committee authorized to make the lease and to furnish the room.

Mr. Winthrop Bartlett presented a paper on the Olive street cable road. The total length is 9.6 miles. The conduit is 39 in. deep; the Johnson rail, 65 lbs. per yd., is used. The road was built at the rate of 274.2 ft. per day, counting every day from the time of the beginning to that of finishing. Interesting information on the subject of the horse power required under varying conditions of service was given. This varied from 136 to 609 horse power within one minute. About 50 per cent. of the total power is required to drive the cable. Some discussion on this paper was had. A paper by Professor Potter on Fuel Gas was made the special order for the next meeting.

The Western Railway Club.

### The Western Railway Club.

The Western Railway Club.

The club will hold its next meeting Nov. 19, at 2 p. m., in its room, Phoenix Building (Jackson street, opposite Grand Pacific Hotel), Chicago.

The subjects for discussion are "Compound Locomotives," To be opened by E. W. McK. Hughes, of the Fox Solid Pressed Steel Co. (formerly Superintendent of Locomotives on the Northern State Railways of India). Mr. Hughes will describe the methods employed by him in India in changing simple to compound locomotives. "Best Metal for Brake Shoes." To be opened by E. C. Case, of the St. Lonis & Hannibal road. Mr. Case will give an account of experiments with brake shoes made by him.

### PERSONAL.

—Capt. Alexander Wallace, President of the Jackson-ville, Mayport & Pablo Railroad & Navigation Co., died in Jacksonville, Fla., Nov. 11.

—Mr. Samuel Spencer has been elected President of Suburban Rapid Transit Railroad, of New York, to succeed Herman C. Schwab, resigned.

—Mr. Walston H. Brown, recently elected President of this road, has been appointed Receiver in a suit brought by W. S. Todd, of New York.

-Mr. George B. Hazelhurst has been appointed Acting General Superintendent of Motive Power of the Baltimore & Ohio, to take effect Dec. 1.

-Mr. W. C. Baylies, for several years past Assistant Freight Agent of the New York, Lake Erie & Western, has resigned, and the position has been abolished.

–Mr. George E. Hoadley, at one time Treasurer of the nama road, died in Plainfield, N. J., Nov. 11. He was arly 70 years old and had been an invalid for three

—Mr. W. H. Doane, President of J. A. Fay & Co., of Cincinnati, who were awarded the grand prize for their wood-working machinery at the Paris Exposition, has been decorated with the ribbon of the Legion of Honor.

—Mr. D. F. Jennings has been appointed Assistant General Freight Agent of the Toledo, St. Louis & Kansas City at St. Louis, vice Mr. A. W. Street, resigned to be-come Commercial Agent of the Missouri Pacific at Kan-sas City.

—Mr. C. M. Ward has been appointed General Manager of the South Carolina road by the Receiver in place of Col. John B. Peek, who has been connected with the road for the last 10 years. Mr. Ward has been a Division Superintendent on the Baltimore & Ohio.

—Mr. H. C. Potter, who resigned his position as Vice-resident and General Manager of the Flint & Pere Mar-uette a year ago last August, and has since been in urope, has been prevailed upon to return to the service f the company as its General Manager.

—Col. W. C. Faulkner, President of the Gulf & Ship Island and Ship Island, Ripley & Kentucky roads, was shot at Ripley, Miss., Nov. 5, and died the second day after. Colonel Faulkner was a prominent lawyer and business man of Mississippi. He was in the Mexican war, and served in the Confederate army.

—Mr. R. T. Brydon has resigned as General Passen Agent of the Lake Erie & Western. The position will, the present, remain vacant. Mr. Charles F. Daly has be appointed Assistant General Passenger Agent. Brydon will engage in mercantile pursuits in Chica Mr. Daly has been Chief Clerk to Mr. Brydon.

—Mr. David B. Keeler, Assistant General Freight Agent of the Union Pacific, has tendered his resignation, to take effect Jan. 1, 1890. He has held this position for four years, and has also been General Agent of the freight department and Division Freight Agent at Denver for the Union Pacific. Mr. Keeler intends to establish him-self in the insurance business.

-L. F. Bringham, Purchasing Agent and Storekeeper of the Long Island road, has resigned to become Purchasing Agent of the Philadelphia & Reading Coal & Iron Co. L. G. Hubbell, Chief Clerk in the General Freight office in Long Island City, has been appointed Purchasing Agent of the Long Island, and J. M. O'Connor, formerly Assistant to the Purchasing Agent, has been made General Storekeeper.

—Mr. Charles H. Rockwell, Private Secretary to Mr. George M. Pullman, of the Pullman Palace Car Co., since May, has been appointed General Superintendent of the Columbus, Hocking Valley & Toledo, to succeed Mr. George R. Carr, resigned. Mr. Rockwell was General Passenger Agent of the Cincinnati, Hamilton & Dayton when he resigned to enter the service of Mr. Pullman.

Pullman.

—Mr. F. W. Holt, Superintendent and Traffic Manager of the Grand Southern road of New Brunswick, has resigned. Mr. Holt has been connected with the road since 1876, when he entered its service as Assistant Engineer. He has since been Division Engineer, Engineer of Bridges and Buildings, Chief Assistant Engineer, Assistant Superintendent, General Freight Agent, and Superintendent since Jan. 1, 1884,

perintendent since Jan. 1, 1881,

—Mr. J. M. Floesch, for the past eight years Assistant Chief Engineer of the Buffalo, Rochester & Pittsburgh, has been appointed Chief Engineer of the Johnsonburg & Bradford road, now under construction in Pennsylvania, Mr. W. F. Jordan will become Assistant Chief Engineer of the Buffalo, Rochester & Pittsburgh, Mr. Jordan has been with the Buffalo, Rochester & Pittsburgh for some time and came to it from the Burlington & Missouri River.

& Missouri River.

—Mr. Charles H. Platt, Superintendent of the Western and Springfield divisions of the New York & New England, has resigned to become General Manager of the tracks and traffic between the Grand Central Depot and Mott Haven (New York City, on the New York Central & Hudson River, succeeding Mr. C. D. McKelvey, who resigned to return to the New York, Sasquehanna & Western as General Superintendent. Mr. Platt has been in railroad service since 1833, in various capacities on Eastern roads. He has been with the New York & New England since 1881, and has been Superintendent since 1884, first of the Western Division, and since 1887 of the Springfield Division also.

—Mr. George W. Stevens, Superintendent of the

of the Springfield Division also.

—Mr. George W. Stevens, Superintendent of the Eastern Division of the Wabash, has resigned to take a similar position on the Chesapeake & Ohio, at Richmond, Va. Mr. Stevens became connected with the Wabash in 1873 as train dispatcher, in which position he served eight years. He had previously served on other roads as telegraph operator, station agent and train dispatcher. Mr. Stevens was appointed Superintendent of the Ohio & Indiana division in 1881, Superintendent of the Eastern division two years later, and Assistant General Superintendent Jan. 1, 1887. He held this last position until the Wabash was taken out of the Receiver's control last summer, when he became Superintendent of the Eastern Division Mr. E. A. Gould, Master of Transportation, succeeds Mr. Stevens as Superintendent of the Eastern Division of the Wabash.

## ELECTIONS AND APPOINTMENTS.

Alabama Midland.—Richard Butt has been appointed General Passenger Agent of this road, with headquarters at Montgomery, Ala.

Alameda County Terminal,—The officers of this company are: J. H. Woodard, President, 19 Montgomery street, San Francisco; B. Garland, Secretary, Oakland; R. B. S. York, Treasurer, Oakland, and A. C. Rumble, Chief Engineer and Superintendent, Oakland.

Alexandria & Fredericksburg.—The annual meeting of this company and of the Alexandria & Washington, was held at Alexandria this week, and the following directors elected: J. N. Dubarry, John P. Green, John Cassels, George C. Wilkins, John S. Leib, James P. Kerr and Andrew Jamison. The roads are part of the Pennsyl-

Butte County.—The directors of this California road are J. A. Baxter, J. W. Hartzell, D. A. Millin, Charles H. Forbes and R. T. Harding.

Chicago & Great Western.—John T. McBride has been appointed Superintendent of the road, with office in Chicago.

Chicago, Milwaukee & St. Paul.—President Roswell Miller has issued a circular, dated Nov. 5, appointing J. C. Stubbs Second Vice-President, with entire charge of the traffic department of the road.

The business of the General Freight Department of this company has been assigned as follows: D. W. Keyes, First Assistant General Freight Agent, will have direct supervision of coal and lumber traffic. J. C. Boyden, Assistant General Freight Agent, St. Paul, Minn. will have direct supervision of grain traffic in Iowa, Minnesota and Dakota, north of, but not including the Iowa and Minnesota division, and not including the Iowa and Minnesota division south of Ramsey. N. J. Goll, Assistant General Freight Agent, will have direct supervision of all through traffic, including through rates and divisions with connecting lines; also grain traffic not included in the territory of Mr. Boyden. D. C. Jones, Assistant General Freight Agent, will have direct supervision of live-stock traffic, also general business at Mississippi River points south of St. Paul. The office of General Northwestern Freight Agent has been abolished.

Chicago & Ohio River.—The offices of auditor, cashier,

Chicago & Ohio River.—The offices of auditor, cashier, general ticket agent and car accountant will hereafter be located at Kansas, Ill. J. L. Hamar has been appointed Auditor and Cashier. The offices of general ticket agent and car accountant have been abolished, and their duties will be assumed by J. D. Livingston, General Manager.

Chicago, St. Paul & Kansas City.—The annual meeting of the stockholders of the road was held in Dubuque, Ia., Nov. 7. The old board of directors was re-elected as follows: A. B. Stickney, C. W. Benson, W. L. Boyle, A. Oppenheim, Wm. Dawson, J. S. C. Stickney, A. Kalman. A meeting will be held later to elect officers.

Chicago, Santa Fe & California.—The office of Car Accountant of the Company, and of the St. Joseph. St. Louis & Sante Fe, has been removed to Topeka, and junction and mileage reports should hereafter be sent to A. P. Wilder, Car Accountant of the Atchison, Topeka & Santa Fe, Topeka, Kansas.

& Santa Fe, Topeka, Kansas.

Cincinnati, Jackson & Mackinaw,—Owing to the continued ill health of H. R. Johnston, General Freight and Passenger Agent, the duties of that office will be performed by T. C. M. Schindler, Assistant General Freight and Passenger Agent, who will have jurisdiction over the traffic department until further notice.

Denniston Ward has been appointed Treasurer of the road, vice F. Fisher, resigned. Mr. Ward will have his headquarters in New York City.

Cleveland, Cincinnati, Chicago & Sl. Lonis.—T. O. Morris, as Engineer of Maintenance of Way of the Chicago Division, will have direct supervision over all bridges, buildings, tracks and roadway, reporting to the Division Superintendent.

Columbus, Hocking Valley & Toledo,—Charles H. Rock-well has been appointed General Superintendent, with headquarters at Columbus, O., in place of G. R. Carr, resigned.

Dallas, Pacific & Southeastern.—The officers of this Texas company are as follows: President, J. E. Henderson; Vice-President, M. H. McLaurin; Secretary, J. P. Murphy; Treasurer, W. H. Flippen: Chief Engineer, W. J. Sherman. The chief office is at Dallas, Tex.

Delaware & Hudson Canal Co.—H. S. Marcy having re signed the position of Traffic Manager to accept a posi-tion elsewhere, that office has been abolished.

Dunderberg Spiral.—Henry J. Mumford, Manch Chunk, Pa.; James Morgan, 223 Ninth street, South Brooklyn, N. Y.; David L. Prouditt, 1980 Madison avenue, New York; Harry B. Tremaine, 917 Seventh avenue, New York; George Bradford Kelly, Boston, Mass.; John S. Morgan, 223 Ninth street, South Brooklyn, and Jackson A. Nichol, 224 Ninth street, South Brooklyn, are the directors of this New York company.

Ecanswille & Terre Houte.—In addition to his duties as Master of Transportation, G. A. Hurd has been appointed Superintendent of Telegraph at Evansville, Ind.

Grand Rapids & Indiana.—James T. Flaherty, Car Accountant, has resigned, and has been succeeded by W. D. Cowlesham, with office at Grand Rapids, Mich.

Kansas City, Nevada & Fort Smith,—This company has been incorporated in Missouri by Edward L. Martin, Arthur E. Stillwell, William S. Wood, Richard Gentry, Alfred L. Howe, Churchill J. White, Millard C. Curtis, Edward J. Davidson, Robert B. Cone, John McD. Trimble of Kansas City and W. S. Taylor of Burlington, N. J.

Lake Erie & Western.—R. T. Brydon having tendered his resignation as General Passenger Agent, the position will for the present remain vacant. Charles F. Daly has been appointed Assistant General Passenger Agent with office at Indianapolis.

Laks Shore & Michigan Southern.—H. P. Latta has been appointed Master Mechanic of the Toledo Division, with office at Norwalk, O., vice J. M. Sanborn, resigned.

Manhattan Elevated.—The following directors were elected at the annual meeting of the company in New York Nov. 13: Jay Gould, R. M. Gallaway, Russell Sage, Samuel Sloan, Sidney Dillon, George J. Gould, J. Pierpont Morgan, John H. Hall, Cyrus W. Field, Edwin Gould, Chester W. Chapin, Simon Wormser and S. V. White.

Meriden. Waterbury & Connecticut River.—The annual meeting of the road was held in Meriden, Conn., Nov. 12. The old directors were re-elected. The officers elected were: President, H. R. Wilcox; Vice-President, E. D. Steele; Secretary and Treasurer, George Rockwell; Assistant Treasurer, H. L. Wade.

Mexican Central.—A. H. Woods has been appointed General Material Agent, with headquarters at the City of Mexico, in place of R. C. Russell, resigned. S. G. Lewis has been appointed Superintendent of the second division, in addition to his duties as Superintendent of the first division, vice A. H. Woods.

Mexican National Construction Co.—J. C. Mordaugh is to be Superintendent of the Colima road, now being con-structed from Manzanillo through Colima toward Guad-alajara, Mexico.

Mineral Range,—C. M. Hoar has been appointed Auditor and Cashier of this road, and of the Hancock & Calumet, with office in Hancock, Mich., vice C. S. Robinson, resigned.

Minneapolis & St. Louis.—E. A. Whitaker has been appointed General Agent of the passenger department, with office in St. Paul.

Missouri, Kansas & Texas. - Samuel Hunt has been ap-

pointed General Live Stock Agent, with headquarters at Fort Worth.

New York, Lake Erie & Western.—F. L. Pomeroy has been appointed General Freight Agent at New York. W. C. Baylies, Assistant General Freight Agent, having re-igned, all communications heretofore addressed to the Assistant General Freight Agent should hereafter be addressed to the General Freight Agent.

New York & Northern.—At the annual meeting of the stockholders this week, C. T. Barney, J. J. Belden, A. N. Billings, George Coppell, Thomas Denny, H. F. Dimock, R. M. Gallaway, G. G. Haven, R. S. Hayes, William Mertens, O. H. Payne, George W. Smith and William C. Whitney were elected directors, and R. S. Hayes was re-elected President and G. G. Haven, Jr., Secretary and Treasurer.

New York, Pennsylvania & Ohio —The annual meeting of the stockholders was held in Cleveland, Nov. 9. The following Board of Directors was elected: Charles F. Whitehead, New York City; John Tod, F. R. Perkins, Fayette Brown, S. L. Mather, W. J. McKinnie and Thomas Warner, of Cleveland; J. M. Ferris, of Toledo; F. A. Wheeler and Simon Perkins, of Sharon, Penn.; Henry B. Perkins, of Warren; Lewis Miller, of Akron, and F. J. Barney, of Dayton. The Board is the same as last year, except that W. W. Scarborough, of Cincinnati, and D. V. Derickson, of Meadville, Pa., retire, and are succeeded by F. Barney and Simon Perkins.

Ohio Southeys.—E. B. Croshy has been appointed Au-

Ohio Southern.—E. B. Crosby has been appointed Auditor of this road, with office in Indianapolis, to succeed C. B. Lockwood.

Orange County,—The following appointments have been made: P. H. Wyckoff, General Freight Agent, with office at 119 Liberty street, New York; H. P. Baldwin, General Passenger Agent, with office at 119 Liberty street, New York; Miles G. Demerest, Superintendent, with office at Greycourt, N. Y.; Emmet Helms, General Agent, with office at Campbell Hall, N. Y.

Pennsylvania, Poughkeepsie & Boston.—E. S. Fallon has een appointed Auditor,

Pittsburgh, Columbus & Fort Smith.—John W. Brener, ames Palmore, Pittsburgh, Kan.; O. J. Nichols, W. H. ogshall, Cherokee, Kan.; E. C. Scammon, J. P. Campell, Columbus, Kan.; D. C. Finn, Baxter Springs, Kan.; L. H. Adair and H. E. Kelly, Fort Smith, Ark., are the acorporators of this Kansas company.

Port Royal & Western North Carolina,—At the stock-holders' meeting in Augusta, last week, the old board of directors was elected, as follows: President. E. P. Alexander; Directors, E. P. Alexander, W. L. Mauldin, E. F. Verdery, J. H. Alexander, E. R. Schneider, J. B. Cumming, W. L. Gray, John Ferguson, T. J. Moore, John C. Calhoun, J. M. Barksdale, J. J. Pluss and W. W. Humphreys.

Rio Grande Southern.—The directors of this new Colorado company are: Otto Mears, Job A. Cooper, Henry R. Walcott, Samuel N. Wood, M. D. Thatcher, John L. McNeil, Edward Richards, D. C. Hartwell, William Barth, Ernest Waters and Fred Walsen.

Sioux City & Northern,—J. G. Butterfield has been appointed Master Mechanic, with office in Sioux City, Ia.

South Caroling.—C. M. Ward has been appointed General Manager in place of Col. John B. Peck.

eral Manager in place of Col. John B. Peck.

Southern California — The following are the officers of this consolidated company: George C. Magoun, President; A. Manvel, First Vice-President; J. W. Rheinhart, Second Vice-President; F. H. Pattee, Secretary, Treasurer and Tax Commissioner; C. S. Tuckerman, Assistant Secretary; G. L. Goodwin, Assistant Treasurer; J. P. Whitehead, Comptroller; John J. McCook, General Counsel; George R. Peck, General Solicitor; H. C. Whitehead, Auditor; K. H. Wade, General Manager; F. T. Perris, Chief Engineer.

Toledo, St. Louis & Kansas City.—D. F. Gennings, of Chicago, has been appointed Assistant General Freight Agent at St. Louis, vice A. W. Street, resigned to be-come Commercial Agent of the Missouri Pacific at Kan-sas City.

as City.

Union Pucific.—The following appointments have been nade in the traffic department: P. A. Wanack, Assistant ideneral Freight Agent, Elmer H. Wood, Assistant General Freight Agent, J. W. Scoot, Assistant General Passenger Agent, all at Omaha: B. Campbell, General Passenger Agent, all at Omaha: B. Campbell, General General Freight Agent, Portland, Ore.; A. L. Maxwell, General Egent, Traffic Department, Portland; Francis Cope, ideneral Freight and Passenger Agent, Salt Lake City. W. P. Robinson, General Freight Agent, St. Joseph, Mo. T. W. Lee, Assistant General Passenger Agent at Portland. F. L. Lynde, Traveling Passenger Agent at St. Paul, has been appointed General Passenger Agent at St. Joseph.

Wahush.—George W. Stevens, Superintendent of the

Wabash.—George W. Stevens, Superintendent of the Eastern Division at Peoria, Ill., has resigned to accept a similar position on the Eastern Division of the Chesapeake & Ohio. E. A. Gould, Master of Transportation at Decatur, Ill., since the reorganization, has been appointed Superintendent of the Eastern Division. A. H. Landers, Master of Transportation at Moberly, succeeds Mr. Gould at Decatur, and E. H. Fitzhugh, Chief Clerk for F. H. McGuigan, Superintendent of the Western Division, has been appointed Master of Transportation at Moberly. Moberly.

Winona & Southwestern.—H. E. Lamberton has betted President of the road, vice Hon. W. Windesigned.

resigned.

Wisconsin Central,—The following appointments have been made: M. B. Cutter, to be Superintendent of the Portage, Chippewa, Ashland and Penokee divisions, in place of C. O. Wheeler, resigned to become General Superintendent of the Chicago, Santa Fe & California, E. R. Knowlton, of the Northern Pacific, has been appointed Superintendent of the Chicago & Milwaukee Division, in place of T. C. Clifford, resigned to become Superintendent of Dining Cars to fill the vacancy caused by the resignation of S. H. Brown.

by the resignation of S. H. Brown.

Wisconsin Central Co.—The annual meeting of the company was held in Milwaukee, Wis., Nov. 6. The old officers were re-elected, as follows: President, Charles L. Colby; Vice-President and Secretary, Edwin H. Abbot; Second Vice-President, David S. Wegg; Comptroller and Assistant Treasurer, Frederick Abbot; General Manager, S. R. Ainslie; General Superintendent, Gavin Campbell. Directors, Thomes J. Hyman, Henry C. Barlow, Frederick Abbot, David S. Wegg, S. R. Ainslie, Howard Morris and Frederick N. Finney, of Milwaukee; Colgate Hoyt, Charles H. Ropes and Charles L. Colby, of New York, and Edwin H. Abbot of Boston.

#### OLD AND NEW ROADS.

Alameda County Terminal.—It is expected to resume work on this road this week. In a re completed at Alameda, Cal. It is projected to extend from Alameda to Custer Valley, a distance of 15 miles, and will reach stone quarries. The construction work is done by the company. The maximum grade is 2½ per cent. and the maximum curves 10 degrees. There is a tunnel 420 ft. long, and a trestle 1,100 ft. long and 35 ft. high. A. C. Rumble, of Oakland, Cal., is Chief Engineer and Superintendent.

American Midland.—On petition of the many creditors of this company J. P. Carothers, of Toledo, O., was this week appointed Receiver by the United States Court at Cleveland.

Atchison, Topeka & Santa Fe.—The gross earnings operating expenses (exclusive of taxes), and net earnings of the road and its auxiliary lines for the month of September, 1889, were as follows:

Name of road.	Gross earn.	Oper.	Net C earn. M	
Atchison, Topeka & Santa Fé and Leased Lines, including Chicago Line, St. Joseph, Chicago, Kansas & Western, New Mexico & Arizona, and				
Sonora roads	\$2,018,729	\$1,229,487	8789,243	4,934
Colorado	5,512	4,686	826	61
Fé	427,715	272,165	155,550	1,058
California Central California Southern	79,081 49,762	64,655 43,390	14,426 6,372	$\frac{265}{210}$
Total	\$2,580,799	\$1.614,383	\$976,416	6,529
Roads jointly owned with other companies: Atchison Companys' one- half		99,442	11,308	582
Grand total	\$2,691,549	\$1,713,825	\$977,724	7,111
The comparative stat	ement of		as follow -Per n	

 September, 1889 September, 1888	Gross earn. \$2,691,550 2,543,072	Net earn. 8977,725 698,742	M'l'g'e. 7,112 7,066	Gross earn. \$378 360	Net earn. \$137
Increase Sept. 1889	\$148,478	\$278,983	46	\$18	838
Atlanta & Fl	orida _T	his comp	any had	d ages	nd to

Atlanta & Florida.—This company had agreed to bond its road for \$15,000 a mile, and issue a first mortgage to the Georgia Improvement Co., a construction company organized to build the line, but as it has been in financial difficulties and unable to meet expenses, the construction company has agreed to accept a mortgage bond at the rate of \$8,000 a mile.

Aylmer & Port Burwell.—A survey has recently been made of this road, which it is proposed to build from Port Burwell, Out., to Kingsmill, a distance of 15 miles. The company is making arrangements to begin construction.

Baltimore & Ohio.—The statement of the earnings and expenses for October, 1889 (approximated), compared with October, 1888, is: Earnings, 1888, \$1,833,541, and 1889, \$2,224,249, an increase of \$570,708; expenses, 1888, \$1,880,528, and 1889, \$1,266,736, an increase of \$77,298; net. 1888, \$664,013, and 1889, \$957,513, an increase of \$293,500.

Burlington & Missouri River.—Tracklaying on the extension from Alliance has reached Newcastle and the line will be opened at once to that point. Trains are now running regularly to Crawford, Neb., 65 miles from Alliance. The survey of the line to the Black Hills has been completed as far as Hill City, Dak.

Butte County.—The company has been chartered in California to construct a standard-gauge road from the station of the Northern California in Oroville to Chico, and to Thermalito, and also a branch to a point upon the Marysville branch road. The capital stock is \$40,000.

Canadian Pacific.—Construction work on the Bran-ton & Loures Branch, has, it is stated, been suspended an account of the difficulty of obtaining rails. Only five niles of track is laid, and the early completion of the line is likely to be delayed.

Chicago, Kansas & Nebraska.—A special meeting is to be held in Topeka, Kan., Dec. 3, to ratify the agree-ment entered into by this company and the Chicago, Rock Island & Pacific with the Kansas City, Wyan-dotte & Northwestern and the Kansas City & Bea trice, whereby the two last-named companies have the joint use of that portion of the road between Virginia and Beatrice, Neb., 15 miles.

and Beatrice, Neb., 15 miles.

Chicago, Milwaukee & St. Paul.—The annual report for the year ending June 30 states that of the \$150-000,000 general mortgage gold bonds authorized at the stockholders' meeting in June last, \$6,000,000 have been issued bearing four per cent. interest, of which \$5,000,000 have been sold. The miles of road operated are as follows: In Illinois, 318; in Wisconsin, 1,310; in Iowa, 1,575; in Minnesota, 1,120; in Missouri, 140; in Dakota, 1,125; a total of 5,678.

The following shows the earnings, expenses, and statistics for the year ending June 30:

Gross earn Op. exs	1888. \$24,726,742 16,474,317	1889. \$25,422,559 16,548,385	Inc. 695,817 74,668
Net earn Tons freight carried	7,675,934	\$8,874,174 7,769,875 7,888,332	621,749 93,941 1,158,267

The averge rate per ton per mile was: 1889, 1.059 cents: 1888, 1.060 cents. The revenue per passenger per mile was 2.418 cents in 1889, against 2.445 cents in 1888.

Cincinnati & Bedford.—Oliver Ferguson & Son, of Bedford, Ind., who have been awarded the contract for grading, cross ties and tracklaying, began work this week at Riverdale, Ind., on the Ohio & Mississippi. The work is to be completed to the White River by Jan. I. Reed's station, 14 miles northwest of Riverdale, will be the northern terminus. Edward P. Cutter, Cincinnati. O., is President.

O., is President.

Cincinnati, Jackson & Mackinaw.—The survey of the proposed extension north from its present terminus at Addison, Mich., to Jackson, 20 miles, is nearing completion, and construction work will, it is stated, be commenced soon.

On the application of William Stewart Todd, of New York, who holds a judgment against the railroad company for \$228,397, the United States Circuit Court at Toledo, O., this week appointed the President of the road, Walston H. Brown, Receiver. The company oper-

ates 287 miles of road, from Franklin, O., north to Addison Junction, Mich., 189 miles, and from Toledo northwest to Allegan, Mich., 98 miles.

Columbus & Cincinnati Midland.—A meeting of bondholders, representing \$1,500,000 of the total issue of \$2,000,000 bonds outstanding, was held in Philadelphia this week, to take action looking toward an amicable adjustment of the rate of interest on the first mortgage six per cent, bonds of that company. The Baltimore & Ohio has made an offer that if the interest be reduced to four per cent, it will guarantee principal and interest. A committee was appointed to take such action as may be necessary in protecting the interests of the bondholders.

Confluence & Oakland.—This road, recently completed, was formally opened this week. It extends from Confluence, Pa., on the Baltimore & Ohio, along the Youghiogeny River to Friendsville, Md., a distance of 20 miles and reaches valuable timber lands, owned by the Yough Manor Land Co., by whom the road was built.

Cooperstown & Charlotte Valley.—The preliminary survey is nearly completed from Cooperstown Junction, N. Y., on this road, about 50 miles southeast to Catskill. After leaving Cooperstown Junction the survey follows the valleys of the Charlotte and Schoharie creeks, in Delaware and Greene counties, crossing the Catskill summit at a point near East Windham, 1,953 ft. above the level of the sea, and thence down the valley of the Catskill Creek to the Hudson River. This route has a maximum grade, for a short distance, of 110 ft. to the mile.

Delaware, Lackawanna & Western.—The earnings of the road and its leased lines for the quarter ending Sent 30 were as follows:

Gross earnings Operating expenses	1889. \$2,504,300 1,174,016	1888. \$2,383,869 996,360	1	or dec. \$120,431 177,656
Net earnings	\$1,330,284 567,749	\$1,387,509 551,249		\$57,225 16.500
Surplus	\$762,535	\$836,260	. D	\$73,735

Denison & Washita Valley.—The road is now in operation from Denison via Lehigh, I. T., to Coal Gate mine No. 2, a distance of 64 miles from Denison, Tex. Edward Perry, Denison, is Superintendent.

Fitchburg.—The following are the earnings and exenses for the quarter to Sept. 30 and the fiscal year:

Quarter to Sept. 30. Gross earn Oper. expen	1889. \$1,658,475 1,063,032	1888. \$1,614,236 1,070,562	Inc. L. D.	or dec. \$44,237 7,530
Net earn		\$543,674 294,507	I. I.	\$51,769 4,885
Surplus	. \$296,050	\$249,167	1.	\$46,884
Fiscal year. Gross earn Oper. expen	1888-89. . \$5,811,979 4 254,990	1887-88. \$5,460,951 4,018,493		Inc. \$354,028 236,497
Net carn	\$1,559,989 1,227,875	\$1,442,458 1,196,048		\$117,531 31,827
Surplus	332,114	246,410		\$85,704

Flint & Pere Marquette.—The work of changing the Port Huron & Northwestern Division from narrow to standard gauge, between Port Huron and East Saginaw, Mich., 91 miles, will be completed this week.

Fort Worth & Rio Grande.—Tracklaying on this road has been completed from Stephenville, for nearly 15 miles toward Dublin, Tex. It is expected that the construction work will be continued from Dublin until it is completed to Comanche. Passenger trains have not yet begun running between Granbury and Stephenville, as the track is not surfaced.

Georgia, Carolina & Northern.—Surveys are still in progress between Chester and the Savannah River, and also between the Savannah River and Athens, Ga. It is claimed that grading will commence in a few days on the section between Chester, S. C., and the Savannah River.

River.

Georgia Pacific.—The survey was commenced this week for a branch from Baird, Miss., down to the Yazoo Valley, a distance of 55 miles, to Yazoo City, through a rich agricultural section.

A survey has also been commenced from Itabena, near Greenwood, Miss., northwest 87 miles, to Helena, Ark., where connections are made with the Missouri Pacific system. This survey is now nearly finished. Gibson & Corpening, of Birmingham, are building 40 miles of road from Itabena toward Memphis, and this may be changed to run to Memphis.

The Hecla mines branch of the road, two miles in length, from North Birmingham, Ala., to the mines, has been completed and opened for traffic. The Prude Creek branch, three miles in length, is also now open for business. The Little Warrior branch, two miles in length, from the main line, near the Little Warrior River, out to Hooker's coal mines, will be finished in a few days.

Goderich & Wingham.—This company is asking subsidies of the towns along its proposed route, to aid it in building the road, which is projected from Goderich northwest through Dungannon to Wingham, Ont., a distance of about 20 miles.

Grand Trunk.—The Chief Justice has dismissed the application of the city of Hamilton, Ont., to prevent the company constructing a loop line around Hamilton, Ont., connecting the Hamilton & Northwestern and the Great Northwestern roads, about two miles from the city, to complete the through line to Niagara Falls without running through the city.

Great Northwest Central.—Tracklaying has been finished on the first ten miles from Brandon, Man., and the work is proceeding from that point rapidly. Mac-donald & Schiller, of Toronto, are building the first 50

Hutchinson & Southern.—John Wolf & Co., Ottumwa, Ia., have, it is reported, the contract for the construction of the line from Kingman, Kan., south to the crossing of the Indian Territory line.

Interoceanic.—Hampson & Sullivan, of the City of Mexico, have been awarded the contract for grading 982 miles between Jalapa and Vera Cruz, to be completed by Dec. 31, 1890. This contract includes the most difficult work on the line.

route than the present Buffalo, Rochester & Pittsburgh. Its officers are entirely distinct from the latter, however, although it will be operated in connection with it. The road is 40 miles in length and extends over the mountains south of Bradford. The contract has been let to Col. A. J. Wilcox. This includes the entire work of construction. The grading has already been commenced.

struction. The grading has already been commenced.

Kansas City, Nevada & Fort Smith.—This company, referred to last week as the Kansas City, Monett & Fort Smith, has filed its articles of incorporation in Missouri. The proposed road is to extend from Kansas City in a southerly direction to the southern boundary line of the state, in the county of McDonald or Barry, and thence in the direction of Fort Smith, Ark., in McDonald County, 170 miles. The road will pass through the counties of Jackson, Cass, Bates, Vernon, Barton, Dade, Lawrence, Barry, Newton and McDonald. The capital stock is \$3,500,000. It is stated that grading will begin at Monett and perhaps at Nevada in consideration of the right of way through Vernon County, depot grounds, 30 acres of land and \$40,000. To secure this about \$54,000 has been subscribed, leaving a balance of \$46,000 yet to be raised. E. L. Martin, of Kansas City, is President.

Kansas City, Wyandotte & Northwestern.—The company has filed a mortgage for \$7,500,000 in Kansas in favor of the new York Security & Trust Co. The mortgage runs for 100 years and bears five per cent. interest.

Lac Seul.—This company has a charter for a road to extend from Shelley River, on the Canadian Pacific, between Winnipeg and Rat Portage, Man., to English River, and is now asking a government land subsidy. The road will open up valuable timber lands in Manitoba.

Little Rock, Mississippi River & Texas.—The case of Jay Gould against the company to foreclose a deed of trust executed by it and given to Elisha Atkins and others as trustees, and by them assigned to Jay Gould, was heard this week in the Federal Court at Little Rock. This case involves land worth about \$500,000, and a large number of people have intervened, claiming to have a prior lien, and they allege the deed of trust to be illegal.

Louisiana, North & South.—Tracklaying will probably be completed this month on the extension from Gibsland south to Sparta, La., about 10 miles. All the grading has been finished.

Louisville & Nashville.—The city of Clarksville, Tenn., is raising a subsidy of \$50,000 to secure an extension of this road from Clarksville south to Dickson, about 30 miles. The extension was agitated last spring, but it does not appear that the company has yet agreed to build the line.

to build the line.

Manhattan (Elevated).—During the fiscal year ending Sept. 30 the road carried 174,497,433 passengers, an increase of 8,967,987 over preceding the year, and an increase of 20,534,201 over the year ending Sept. 30, 1887. Ten years ago, the year ending Sept. 30, 1879, the total traffic of the whole system amounted only to 46,045,181 passengers, or only a little more than double the last year's increase over that of two years ago. As compared with 1879 the increase is 133,452,252 passengers. The number of passengers carried on the elevated system since its erection has been 1,202,920,332. The figures for the year ending Sept. 30, for the various divisions, are as follows:

Second Avenue	69,924,730 58,329,410	1888. 32,290,953 68.308,460 53,115,965 17,814,411
All lines	179,497,433	171.529.789

All lines. 173,97,433 171,522,739

The net earnings for the last year over interest and rentals were \$2,104,406, equal to 8.09 on the capital stock. From the net earnings a dividend of one per cent., \$260,000, was paid in cash and 4½ per cent. in scrip. This leaves the surplus for the quarter \$674,406. The business of three years compares as follows:

Year ended Sept. 30: 1887. No. passengers carried158,963,232 Gross earnings	1888. 171,529,789 \$8,673,871 5,201,050	1889. 179,497,433 \$9,080,881 5,422,394
Net earn. \$3,132,212	\$3,472,821	\$3,658,487
Interest & rentals. 1,554,080	1,554,080	1,554,080
Balance \$1,578,132	\$1,918,741	\$2,101,407
Dividends paid 1,560,000	1,300,000	*1,430,000
Surplus\$18,132	\$618,741	\$674,407

\*One per cent. cash, \$260,000, and 4½ per cent. scrip, \$1,170,

Marshfield & Southwestern.—This company has filed articles of incorporation in Wisconsin to build a line from Marshfield, in a southerly direction, ten miles. Abbott Lawrence, T. H. Gill and others, of Milwaukee, are the incorporators. The capital stock is \$200,000.

Mexican.—The Pachuca branch has been graded for five miles, and 1,500 tons of rails are expected to arrive from England in a few weeks, but it is not anticipated that the branch will be completed and ready for traffic till next summer.

Mexican Roads.—A contract between the government and Senor Gonzalo Esteva has been signed for the construction of a road from Guadalajara west to Chamela, on the Pacific, and east to Aguas Calientes, on the Mexican Central.

The concession has been granted for a standard-gauge

Mexican Central.

The concession has been granted for a standard-gauge road to extend from Mazatlan, on the Pacific Ocean, through the cities of Durango and Monterey, and terminate at Camargo, on the Rio Grande. The government grants a subsidy of \$8,000 per kilometre.

Mexican Southern.—Hampson & Stanhope are reported to have 4,000 men at work on their contract between Pueblo and Tehuacan, 95 miles. Over half a mile of road is being graded each day, and it is claimed the line to Tehuacan will be finished by December 1.

Michigan Central.—The belt line, 3½ miles long, around Bay City, Mich., will be completed in about a month. The line extends south from Water street, around the city to the Bay City division of the road. Freight trains only will be run at first, passenger trains not being put on until the road is thoroughly ballasted. A storage and assorting yard is also being established which covers 67 acres. This yard will have a storage capacity for 3,000 cars and the assorting yard will hold 300 more. The new yard is situated near the junction of the Belt Line with the Bay City division.

extensions of this company, are now being located. The former is to be constructed from Fort Scott, Kan., via Rich Hill, to a point at or near Tipton, Mo. The Fort Scott & Southern is to build from Fort Scott to Mindon, Mo. The town of Rich Hill has agreed to give the Fort Scott & Eastern 20 miles of right of way from that point.

Moneton & Prince Edward Island.—This company has been organized to build a road from Buctouche, N. B., to deep water at Richibucto Cape, and to operate ferry steamers between that point and Cape Wolfe Prince Edward Island. A road is to be built from Cape Wolfe to connect with the government line in Prince Edward Island.

New Orleans, Ft. Jackson & Grand Isle.—Track-laying will probably be completed this week on the six miles of swamp between Algiers and Bellechasse, La. About half a mile of this will be trestled. Rails for 65 miles of the road are now on the ground.

New Roads.—H. A. Hancox, of Hudson, Mass., has just completed a survey for a road from Marlboro, to connect with the Central Massachusetts road at South Sudbury, Mass.

Mr. Hancox is now making a survey for the Assabet Manufacturing Co., of Maynard, Mass., for a line from that place to South Sudbury, a distance of 4½ miles.

New York, Chicago & St. Louis.—The earnings for the three months to Sept. 30 were as follows:

Gross earnings Oper, expenses		\$1,131,983 912,244	Inc. I. I.	or Dec. \$226,447 57,811
Net earnings Fixed charges	\$388,375 244,246	\$219,739 249,828	I. D.	\$168,636 5,582
Surplus	618,189	Def. \$30,088 424,664 174,208	I. L. D.	\$174,218 183,525 37 269

New York, New Haven & Hartford.—The directors have decided to have work begin at once upon the double tracking of the Shore Line and to complete the work as soon as possible from Clinton to New London. It was also voted to four-track the main line for five miles south from New Haven. This will involve new tracks over the meadows, for which the piling can be sunk during the winter when the ice makesthe surface firm.

New York, Penusylvania & Ohio.—The annual report says that in the aggregate the improvements made during the past 18 months amount to \$2,500,000. The earnings for the year ending Sept. 20, 1888, were \$6,377,967; for the year ending Sept. 30, 1889 (September estimated), \$6,427,142; increase for the year, \$49,175. The rental to the company from the New York, Lake Erie & Western of 32.5 per cent. of the gross earnings amounted to \$2,078,821.

Norfolk & Western.—It is stated that the proceeds of the issue of \$45,000,000 new bonds will be used as follows: The first \$10,000,000 to take up \$694,000 Norfolk Terminal bonds; \$975,000 to be used to reimburse the company for money spent in improvements on the property; \$6,000,000 for building the surveyed extension to Ironton, O., about 195 miles: \$1,500,000 for about 17 miles small branch lines; \$525,000 for retiring convertible debenture bonds and \$10,000,000 to be used in buying terminals, building second tracks, etc.

ble debenture bonds and \$10,000,000 to be used in buying terminals, building second tracks, etc.

Northern Pacific.—The directors, at their meeting this week, discussed the resolution of the preferred stockholders, passed at the meeting held on Oct. 17 last, which recommended the incoming board to consider the distribution of the whole amount due the preferred stock under the plan of reorganization as soon as the company shall be financially in proper condition to do so, and took action as follows: The board found that there was due to the preferred stockholders, under the plan of reorganization, from July 1, 1882, to June 30, 1889, \$2,844,429. That in their judgment it was prudent to defer definite decision regarding the distribution of this amount till the issue of the new consolidated mortgage bonds should be made, the sale of sufficient bonds to meet the various requirements of the company effected, and the future earnings should more definitely show to what extent the dividend-earning capacity could be safely relied on. That out of the bonds to be issued under the consolidated mortgage there should be set aside from those first issued an amount which at 85 shall be equal to \$2,844,429, the bonds so set aside to be held by the treasurer of the company until further ordered by the board. It being ascertained that for the months of July, August and September the surplus earnings amount to \$716,849.35, or nearly two per cent. on the outstanding preferred stock, the board declared a dividend of one per cent., due the preferred stockholders of record Dec. 15, 1889, and payable Jan. 15, 1890, out of the surplus earnings accrued since July 1, 1889.

Fifty-five miles of track have been laid on the new

Fifty-five miles of track have been laid on the new line from Gallatin to Butte, Mont., and the remaining distance, fifteen miles, will be finished by Jan. 1. In addition to this line the company has completed 97 miles of new road this year on the following lines: From Little Falls to Staples Mills, Minn., 33 miles; an extension of the Jamestown & Northern branch from Minnewaukan north to Leeds, Dak., on the St. Paul, Minneapolis & Manitoba, 18 miles, and an extension of the Central Washington branch from Davenport northwest to Almira, Wash., 46 miles, The company has let contracts for building 204 miles of new road as follows: From Sappington to Norris and Pony, Mont., 28 miles, and from Boulder to Elkhorn, Mont., 21 miles. These lines are under contract to Green, Keefe & Co., of Helena, Mont. The line from Missoula, Mont., to Mullan, Idaho, 140 miles, and the extension of the Central Washington road northwest from Almira to Grand Coulé, near the Columbia River, 15 miles, have been let to Woods, Larson & Co., of Minneapolis.

Northwestern Coal & Navigation Co.—This com-

Northwestern Coal & Navigation Co.—This company proposes to extend its line from its present terminus at Lethbridge, Alberta, westerly through Crow's Nest Pass, and to a point on the Canadian Pacific or to a point on the International boundary line.

Ohio Southern.—This company has filed for record copies of a mortgage in favor of the Central Trust Co., of New York, for \$2,800,000.

Omaha, Dodge City & Southern.—The company has succeeded in forming a construction company in New York City, which has undertaken the completion of 212 miles of road from Dodge City, Kan., northeast to Superior, Neb.

Johnsonburgh & Bradford, Pa., by a much shorter

the Belt Line with the Bay City division.

Missouri Pacific.—The Fort Scott & Eastern and the organized at Omaha, Neb., and Pierre, Dak., to build a road connecting the two cities. The line as projected

extends up the James River from Yankton to Mitchell, and thence to Pierre.

ond thence to Pierre.

Orange County.—The road was opened for business from Greycourt to Campbell Hall, N. Y., 11 miles, Nov. 11. This line has been built in the interest of the Central of New Jersey to form a connecting link between the roads controlled by it and the roads of Eastern New York and Central New England. From Easton, Penn., or Phillipsburg, N. J., business has already begun to pass northeastward over 13 miles of the Belvidere Delaware road, controlled by the Pennsylvania, to Belvidere, N. J., thence over 63 miles of the Lehigh & Hudson River road to Greycourt, N. Y., and from there over the Orange County road to Orange Junction, N. Y.

Orsgon Short Line & Utah Northern —Surveys are

County road to Orange Junction, N. Y.

Oregon Short Line & Utah Northern.—Surveys are being made preparatory to changing to standard gauge that part of the Utah & Northern still remaining narrow, from Ogden, Utah, north to Pocatello, Idaho, 153 miles. From a point beyond Brigham, 25 miles north of Ogden, and near the Bear River, the survey leaves the old route and joins it again at Logan. This avoids the long detour via Colliston. A second party of engineers is surveying the line from Richmond, Utah, 71 miles north of Ogden, to Pocatello, 82 miles.

The United States Circuit Court at Denver gave a decision remanding to the State District Court the matter of the writ of mandamus applied for, asking the court to compel the company to rebuild, equip and operate the portion of the Colorado Central between Fort Collins, Colo., and Cheyenne, Wyo., which has been abandoned for some years.

for some years.

Pennsylvania.—The company is building a number of small branch lines in various parts of Pennsylvania. In the coke regions around Connellsville about ten miles of road is being constructed, and in the bituminous coal regions other small lines are building.

Pittsburgh, Columbus & Fort Smith.—This company filed a charter at Topeka last week to build a road from Pittsburgh southerly through Crawford and Cherokee counties to the south line of the state, thence through the Indian Territory via Afton and Tahlequah to Fort Smith, Ark. The estimated length of this line is 192 miles, 45 miles being within the state of Kansas. The capital stock is fixed at \$1,000,000.

Pontiac, Oxford & Port Austin.—The Pontiac, Oxford & Northern has entered into possession of the railroad and property of the Pontiac, Oxford & Port Austin, recently in possession of the Farmers' Loan & Trust Co., of New York, trustee, and the road, which extends from Pontiac, to Caseville, Mich., 100 miles, will hereafter be operated by that company.

Port Arthur, Duluth & Western.—This road is now completed for the first 20 miles, from Port Arthur to Kaministiqua, Ont. The road will cross the international boundary line at Gun Flint Lake.

boundary line at Gun Flint Lake.

Portland, Seattle & Northern.—A press dispatch states that negotiations are in progress for the consolidation under the above name of all the roads between the Cascade range, in Washington, and the Pacific seaboard, and between the Columbia River on the south and the international boundary on the north. The company will absorb the Seattle, Lake Shore & Eastern, the Columbia & Puget Sound, the Seattle & Northern, the Port Townsend Southern, the Olympia & Gray's Harbor road and the Bellingham Bay & British Columbia. The uncompleted portions of these lines will be completed by the new company, and the whole operated as an independent system. The dispatch further says that Paul F. Mohr, Vice-President of the Seattle, Lake Shore & Eastern Railway, will become Vice-President of the consolidated company.

Poughkeepsie & Hudson.—The company has been in-

Poughkeepsie & Hudson.—The company has been in-corporated in New York to build a road 41 miles long, from a junction of the Boston & Albany with the Kind-erhook & Hudson, through Livingston, Blue Stone, Cler-mont, Upper Redbank, Rhinebeck, Pleasant Plains and East Park to a point on the Central New England & Western, near Poughkeepsie. The capital is \$410,000.

Quebec, Montmorency & Charlevoix.—This company is now operating a line from Hedleyville, near Quebec, to Ste. Anne, about 20 miles. W. R. Russell is Superintendent at Quebec.

Rio Grande Southern.—Articles of incorporation were filled in Colorado last week by this company, which proposes to build a road, 160 miles long, from Dallas, in Ouray County, on the Denver & Rio Grande, and extend to Telluride, in San Miguel County; Rice, in Dolares County, and Durango, in La Plata County. The capital stock is \$3,500,000.

St. Louis & Chicago.—Judge Gresham has approved the sale of the road to the Reorganization Committee, representing the second-mortgage bondholders, who purchased the road at the Master's sale in Springfield in October.

St. Louis, Iron Mountain & Southern Railway.—A mortgage for \$45,000,000 to the Mercantile Trust Co., of New York, was filed in court at Little Rock, Ark., last week. It is a supplemental indenture to the general consolidated railroad and land grant mortgage given by the same road in 1881 for \$32,036,000.

Satsop.—This company has filed supplemental articles of incorporation in Washington to build a road from Hammersley Inlet, in Mason County, west along the valley of Goldensborough Creek to its head waters, and westerly to the headwaters of the Satsop river, in Mason County, and thence to Gray's Harbor. Alfred H. Anderson, Benjamin B. Healy, Chester F. White and James R. McDonald are the trustees.

Seneca & Potomac.—Nearly all the right of way has been secured for this road, which was recently incorporated in Maryland. Compensation for the right of way is demanded by some owners of the right of way. The line is to extend from Boyd's Sta, on the Baltimore & Ohio, to Seneca, a distance of 10½ miles. It is estimated that it will cost \$88,000 to build the road, of which amount the Baltimore & Ohio has agreed to take \$44,000 in stock, the Seneca Sandstone Co. \$30,000, and \$7,000 more has been subscribed along the route. This leaves \$7,000 yet to secure.

Sioux City & Northern.—E. P. Reynolds & Co. have been awarded the contract for grading the road between Merrill and Sioux City, Ia., 18 miles. This firm has just completed the line from Merrill to Garretson. Sub-contracts have been let, and grading has been commenced.

South Atlantic & Ohio.—About 20 miles of grading has been completed on this line between Clinchport, Scott County, Va., and Big Stone Gap, Wise County, Va., leaving eight miles yet to be completed to reach Big

Stone Gap. The track has been laid for three miles from Clinchport. The contractors are Mason, Hoge & Co., of Frankfort, Ky. The maximum grade is 150 ft. to the mile, and the maximum curve is 10 degrees. The Keystone Bridge Co., of Pittsburgh, Pa., has the contract for the iron bridges. The line is now in operation from Bristol, Tenn., to Clinchport, 43 miles, and is being built to open up the coalfields of Southwest Virginia and Kentucky. W. F. Gordon, Jr., of Clinchport, is Chief Engineer.

Southern California.—The directors of the California Central have ratified the action already taken by the directors of the California Southern and Redondo Beach companies, and these three roads will hereafter be operated under the name of the Southern California.

Toledo & South Haven.—This road which extends from Lawton to South Haven, Mich., a distance of 37 tiles, is to be changed from three feet to standard gauge.

Washington & Potomac.—A survey is now being made for an extension from Mechanicsville to Point Lookout, Md., 45 miles, and it is stated that arrangements for building the line have been made. The company is a reorganization of the Southern Maryland, which has operated a line from Brandywine to Mechanicsville, 20 miles. The present company also proposes to extend the line to the City of Washington.

Western & Atlantic.—The Georgia legislature has passed a bill providing for the lease of the road. The terms of the lease are substantially as follows: For a term of 20 years the price demanded is \$35,000 a month; for 30 years, \$40,000 a month, and for 40 years, \$50,000 a month. In addition to this the lessees must pay all taxes due to the state of Tennessee, and also the taxes due to counties in Georgia. The question of "betterments" claimed by the present lessees was laid over to be settled by the next legislature, which meets two months before the lease expires. The bids for the new lease will be opened next July.

Western Maryland.—It is stated that a survey is

Western Maryland.—It is stated that a survey being made for a proposed extension from Willian port, Md., across the Potomac River and west to a co nection with the Baltimore & Ohio in West Virginia.

Wilmington & Weldon.—The contract for the grading and trestling on the extension from Greenville, Pitt County, south to Kingston, Lenoir County, N. C., 28 miles, referred to last week, will be let Nov. 23. The work will be let in sections of seven miles. Fleming Gardner, Wilmington, N. C., is Engineer of Construction.

Winnipeg & Southeastern.—Nearly all the right of way has been secured for this road from Winnipeg to the international boundary. The contract of Egan Bros., who are grading the line, is understood to also include the tracklaying and equipment. It is reported that negotiations are in progress with the Manitoba & Southeastern looking to a consolidation of the two lines, which propose to build over the same route.

Winona & Southwestern.—Galligan & Leary, of Lanesboro, Minn., have the contract for building the ten miles of this road from Bear Creek, the present terminus, to Utica, Minn., now under construction.

Wisconsin Central Co.—The annual meeting of the company was held in Milwaukee, Nov. 6. The directors submitted their annual report, which stated that the Wisconsin Central Co. was incorporated in 1887 in order that the lines constituting the Wisconsin Central system might be combined under one management for the purpose of effecting the arrangement with the Northern Pacific that is now in force. The financial results of the company's business during the year ending June 30 were as follows:

Total revenue from all sources	
Operating expenses\$1,233,542	
License fees and taxes 60,243	
Interest on bonds	
Rent of equipment	
Terminal charges 124,501	
Rentals 295,758	
	\$2,296,183

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The report states that these figures must not be taken as furnishing any adequate basis of comparison or as indicating the present pecuniary value of any of the company's securities, because it does not show any of the effects of the contract with the Northern Pacific. Reference is made to the Chicago terminals, which include 175 acres of land in addition to the transfer yards of 140 acres. It is recommended that the holders of Wisconsin Central Railroad Co. securities be allowed until Jan. I, 1890, to exchange them for the stocks and bonds of the Wisconsin Central Co., but suggests that after that date a premium of at least 10 per cent. be charged. The report says that the success of the past 11 years is largely to be attributed to that feature of the organization plan which divested the stock of its voting power, and intrusted it to the bondholders through their trustees. As showing the advance in the intrinsic worth of the property, it is stated that the total securities of the old Wisconsin Central Railroad, which in 1879 were not worth more than \$2,00,000, now possess in the markets of New York and Boston a value of nearly \$11,000,000. The company operates \$28 miles of road, of which 713 are in Wisconsin. The total passenger earnings for the year were \$1,044,949; total freight earnings, \$2,670,459. The equipment of the road consists of 129 locomotives, 118 passenger cars, 14 Pullman sleepers, 5,196 box and platform cars.

### Traffic Notes.

A car service association is projected at Birmingham, Ala.

Iron ore is now taken from Escanaba to Ohio ports at \$1 per ton. Corn by lake from Chicago to Buffalo is two cents per bushel.

The new grain inspection law of Missouri is resisted by the elevator men at Kansas City and they are threatened with prosecution.

The Missouri Pacific has commenced to vestibule its Pullman sleeping cars, and will soon have the sleeping cars on all the express trains running over its system vestibuled.

Anthracite coal is now being shipped at the rate of 100 tons per day over the Canadian Pacific from the Northwest coalfields to Port Moody, B. C., to be shipped thence to San Francisco.

The Commercial Club, of Kansas City, has established a Transportation Bureau for conducting its dealings with railroad companies. A manager will be appointed whose salary will be about \$4,000.

The Denver Demurrage Bureau has been enlarged into the Colorado Demurrage Association, and its authority will extend to Colorado Springs, Colorada City, Pueblo, El Moro, Trinidad, Canon City, Leadville, Buena Vista, Glenwood Springs and Aspen.

Glenwood Springs and Aspen.

A Kansas City paper states that all the fines imposed by the Trans-Missouri Passenger Association since its organization have been remitted. They amount to many hundred dollars. A change in chairmen and various irregularities and misunderstandings have induced the roads to wipe out all charges and begin anew.

An incident of the present scarcity of cars is the report that potatoes have been shipped in enormous quantities from the West to Eastern points, and that 800 car loads awaiting disposition were in Boston at one time last week. Various roads have refused to receive further shipments of potatoes for Washington and Balti-

The Chicago roads interested in the Florida and Louisiana winter tourist business, at a recent meeting, failed to agree upon a rate sheet for the coming season, and finally announced that none would be issued. This causes much dissatisfaction and the Chicago, Burlington & Northern announces that the usual excursion rates will be put in force by that company, regardless of the action of competitors.

action of competitors.

The Pennsylvania ironmen have objected so strongly to the advance in rates on pig iron that the Central Traffic Association Freight Committee and the Chicago & Ohio River Traffic Association have passed a resolution that the rates named in Central Traffic Association circulars, numbers 569 and 572, dated August 28, 1889, and supplements thereto, on pig iron and articles named in said circulars, be restored Nov. 18, 1889.

The Cleveland, Cincinnati, Chicago & St. Louis, the

The Cleveland, Cincinnati, Chicago & St. Louis, the Cincinnati, Sandusky & Cleveland, and the Columbus, Hocking Valley & Toledo have established a through freight and passenger line between Cincinnati and Toledo. It will take the first-mentioned road from Cincinnati to Springfield, thence on the second to Carey, and on the third to Toledo. The distance is 209 miles. Through passenger trains will be put on Nov. 24.

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Inter-state Commerce Commission.

The complaint of George Rice against the Union Pacific and others involves the following questions:

1. The relative classification of the products of petroleum, in comparison with cotton-seed oil, linseed oil, lard and naphtha.

2. The question of charging the same rate for the return of empty tank cars, irrespective of the weight and capacity of each car.

3. The question of the right to deduct and carry free 42 gallons or other quantity of the products of petroleum out of each tank car, without making a similar proportionate deduction in the amount of petroleum and its products carried by other methods than tank cars.

4. The right to deduct and carry free 12 per cent. or other quantity of gasoline, or any one or more of the products of petroleum, without making similar deductions of like proportions of all other products of petroleum carried under similar circumstances and conditions.

tions of like proportions of all other products of perroleum carried under similar circumstances and conditions.

5. The question of like rating and classification respectively of carload lots and less than carload of petroleum
and its products, irrespective of whether the loading is
in iron or wooden barrels or in cases.

On motion of petitioner, and in order to give all the
railroads of the country an opportunity to be heard, the
Commission has ordered that notice of the pendency of
the complaint be given to about 140 carriers; copies of
such complaint will be furnished on application.

In the case of William L. Rawson against the Newport
News & Mississippi Valley, the Baltimore & Ohio and L.
Boyer's Sons, decided by the Commission this week, it is
held that as the tariff complained of had been discontinued
by the carriers two years ago, no order will be made re
quiring them to desist from enforcing it, as such order
would be vain and useless; and, as the amendment of
March 2, 1889, in express terms had no relation to pending proceedings, and this proceeding was pending at
that time, no reparation could be awarded.

Muscle Shoals Canals,

that time, no reparation could be awarded.

Muscle Shoals Canals,
The steamboat "A. C. Conn," a Mississippi River craft,
has passed through the Muscle Shoals Canals, and will
arrive at Chattanooga to-day. This is the first vessel
which has passed through the great canals, now nearly
completed. The construction of the canals to overcome
obstructions in the Tennessee River, at Muscle Shoals,
was begun by the government in 1873, and nearly \$4,000,
000 has thus far been expended on the work. The opening of the canals, which will formally take place in a few
weeks, will give a navigable waterway nine months in
the year from Chattanooga to the Mississippi River.

Eastbound Shipments from Kanasa City.

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The October eastbound shipments from Kansas City were as follows: Cars of wheat, 2,143; of corn, rye and oats, 2,348; of flour, 405; miscellaneous, 398; packing house product, 703; dressed beef, 903; broom corn, 174; fertilizer, 174; scrap iron, 118; hides and wool, 149; castor beans and flaxseed, 138; cattle, horses and mules, 4,462; hogs and sheep, 725; lead and bullion, 255.

East-hound Shipments.

## East-bound Shipments.

The shipments of East-bound freight from Chicago by all lines for the week ending Saturday, Nov. 9, amounted to 65,579 tons, against 68,940 tons during the preceding week, a decrease of 3,361 tons, and against 51,856 tons during the corresponding week of 1888, an increase of 13,723 tons. The proportions carried by each road were:

	W'k to Nov. 9.		W'k to Nov. 2.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	4,233 8,595	6.5	8,405 5,140	12.2 7.5
Vabash	10,513	16.0	12,279	17.7
tts., Ft. Wayne & Chicago	9,413	14.3	7,800	11.3
hicago, St. Louis & Pitts	8,752	13.4	9,801	14.2
ltimore & Ohio	7,283	11.1	6,513	9.5
icago & Grand Trunk	7,193	11.0	7,224	10.5
w York, Chic. & St. Louis	2,978	4.5	3,781	5.4
icago & Atlantic	6,619	10.1	7,997	11.6
Total	65,579	100.0	68,940	100.0

Of the above shipments 2,517 tons were flour, 26,812 tons grain, 2,330 tons millstuffs, 5,233 tons cured meats, 2,813 tons lard, 8,807 tons dressed beef, 1,215 tons butter, 2,361 tons hides, 271 tons wool and 6,780 tons lumber. The three Vanderbilt lines together carried 27 per cent., while the two Pennsylvania lines carried 27.7 per cent.